

CALFED
BAY-DELTA
PROGRAM

Programmatic Record of Decision

August 28, 2000

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1. INTRODUCTION

The CALFED Bay-Delta Program is an unprecedented effort to build a framework for managing California's most precious natural resource: water. California and the Federal government in partnership, are launching the largest, most comprehensive water management program in the world. This is the most complex and extensive ecosystem restoration project ever proposed. It is also one of the most intensive water conservation efforts ever attempted. It is the most far-reaching effort to improve the drinking water quality of millions of Californians as well as an unprecedented commitment to watershed restoration. And it is the most significant investment in storage and conveyance in decades. This document is the Record of Decision (ROD) for addressing these efforts through a sustained, long-term effort by the CALFED Agencies and stakeholder groups.

The CALFED Bay-Delta Program began in May 1995 to address the complex issues that surround the Bay-Delta. The CALFED Bay-Delta Program is a cooperative, interagency effort of 18 State and Federal agencies with management or regulatory responsibilities for the Bay-Delta. The CALFED Program is a collaborative effort including representatives of agricultural, urban, environmental, fishery, and business interests, Indian tribes and rural counties who have contributed to the process.

The San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta) estuary is the largest estuary on the West Coast. It is a maze of tributaries, sloughs, and islands and a haven for plants and wildlife,

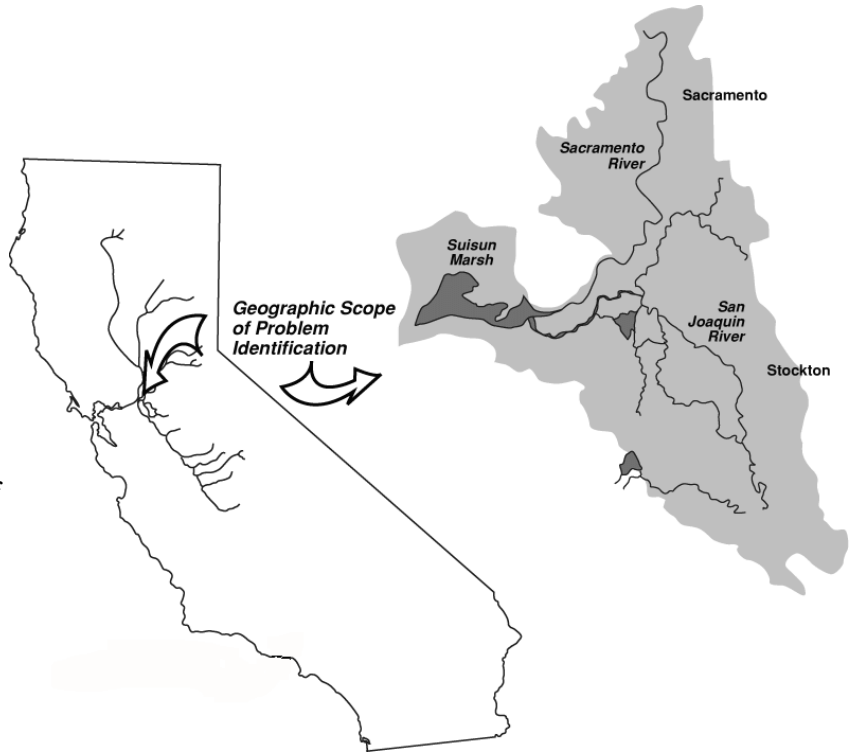
CALFED	
<u>State Agencies</u>	<u>Federal Agencies</u>
<p>Resources Agency of California*</p> <ul style="list-style-type: none"> - Department of Water Resources - Department of Fish and Game - Reclamation Board - Delta Protection Commission <p>California Environmental Protection Agency</p> <ul style="list-style-type: none"> - State Water Resources Control Board <p>California Department of Food and Agriculture</p>	<p>U.S. Department of Interior</p> <ul style="list-style-type: none"> - Bureau of Reclamation* - Fish and Wildlife Service* - Bureau of Land Management - U. S. Geological Survey <p>U.S. Army Corps of Engineers*</p> <p>U.S. Environmental Protection Agency*</p> <p>U.S. Department of Commerce, National Oceanic and Atmospheric Administration</p> <ul style="list-style-type: none"> - National Marine Fisheries Service* <p>U.S. Department of Agriculture</p> <ul style="list-style-type: none"> - Natural Resources Conservation Service* - U.S. Forest Service <p>Western Area Power Administration</p>
<p>* Co-lead agencies for EIS/EIR</p>	

supporting over 750 plant and animal species. The Bay-Delta includes over 738,000 acres in five counties. The Bay-Delta is critical to California's economy, supplying drinking water for two-thirds of Californians and irrigation water for over 7 million acres of the most highly productive agricultural land in the world.

The Bay-Delta is also the hub of California's two largest water distribution systems - the Central Valley Project (CVP) operated by the U.S. Bureau of Reclamation (Reclamation) and the State Water Project (SWP) operated by the California Department of Water Resources (DWR). Together, these water development projects divert about 20 to 70 percent of the natural flow in the system depending on the amount of runoff available in a given year.

These diversions, along with the effects of increased population pressures throughout California, exotic species, water pollution, and numerous other factors have had a serious impact on the fish and wildlife resources in the Bay-Delta estuary. The drought of 1987-92 demonstrated just how vulnerable California is to water shortages. More recent conflicts between water quality, fish protection and water supply also demonstrate how little flexibility there is in the current system. With the State's population expected to grow from 34 million today to 59 million in 2040, the need to conserve, to build our capacity, and to manage our water system more efficiently is no longer just a goal, it is a reality.

Before CALFED, all agreed on the importance of the Bay-Delta estuary for both fish and wildlife habitat and as a reliable source of water, but few agreed on how to manage and protect this valuable resource. The CALFED Bay-Delta Program was established to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. Over the last five years, hundreds of individuals have spent thousands of hours discussing and debating options for a long-term restoration and management plan for the Bay-Delta estuary. The task is fourfold: 1) to restore the ecological health of a fragile and depleted Bay-Delta estuary; 2) improve the water supply reliability for the State's farms and growing cities that draw water from the Delta and its tributaries, including 7 million acres of the world's most productive farmland; 3) protect the drinking water quality of the 22 million Californians who rely on the Delta for their supplies; and 4) protect the Delta levees that ensure its integrity as a conveyance and ecosystem. Through the Bay-Delta Advisory Council,



State and Federal agencies have worked with stakeholders and the public to shape these options into this framework for a comprehensive plan.

The CALFED Program and the CALFED Agencies have approached many ecosystem and water management issues from a regional perspective: what makes the most sense for the affected region. The regions, which include their respective watersheds, are the Sacramento Valley, the San Francisco Bay Area, the Delta, Westside San Joaquin Valley, San Joaquin River/South San Joaquin Valley, and Southern California. Although each region raises unique ecosystem and water management issues, each region's issues affect the health and function of the Bay-Delta system as a whole. Those regional issues nevertheless need regional solutions that contribute to overcoming the challenges facing the Bay-Delta system. In crafting regional solutions, the CALFED Program has also identified and considered the other, independent actions taken by Federal, State and local agencies operating outside the CALFED Program. In addition, CALFED has taken into account its obligations to comply with ongoing commitments, such as the commitments included in the State's area of origin laws.

Consistent with the stated purposes of the CALFED Bay-Delta Program since its outset in 1995, it is not the intent of this program to address or solve all of the water supply problems in California. The CALFED Program is directly or indirectly tied to a number of specific project proposals that would help toward meeting California's water needs for a wide variety of beneficial uses. CALFED is an important piece of a much larger picture that is the continuing responsibility of local, regional, State and Federal jurisdictions.

1.1 Overview

Following issuance of the Record of Decision, CALFED Agencies will proceed to Stage 1 implementation. Stage 1 covers the first seven years of a 30-year program and builds the foundation for long-term actions. This document sets out actions included in the Preferred Program Alternative for implementing Stage 1. These actions also depend upon subsequent project-specific environmental analyses as well as on subsequent review of financial and legislative proposals in this document by the State and Federal executive branches, Congress and the State Legislature.

The program components are as follows:

- C Governance
- C Ecosystem Restoration
- C Watersheds
- C Water Supply Reliability
- C Storage
- C Conveyance
- C Environmental Water Account

-
- C Water Use Efficiency (conservation and recycling)
 - C Water Quality
 - C Water Transfers
 - C Levees
 - C Science

These program components were recently described in the document entitled *California's Water Future: A Framework for Action*, issued on June 9, 2000. The document is referred to as "the Framework" in other locations in this ROD.

All aspects of the CALFED Program are interrelated and interdependent. Ecosystem restoration is dependent upon water supply and conservation. Water supply depends upon water use efficiency and consistency in regulation. Water quality depends upon improved conveyance, levee stability and healthy watersheds. The success of all of the elements depends upon expanded and more strategically managed storage.

California taxpayers, stakeholders and the Federal government will be called upon to invest billions of dollars over the next decade on CALFED programs. Expenditure of those funds must be based upon accountability and measurable progress being made on all elements of the Program. The project schedules described in this ROD depend upon certain assumptions about State and Federal budgets, optimized construction schedules, willing sellers, and other contingencies. These assumptions may change as the CALFED Program progresses and appropriate revisions to the Program may be necessary. Consistent with Federal law, nothing in this ROD constrains the discretion of the President or his successors to make whatever budgetary or legislative proposals he or his successors deem appropriate or desirable. The commitments of the United States and of the State of California under this ROD are necessarily contingent upon the availability of appropriated funds or upon enactment of authorizing legislation providing other sources of funding.

During implementation, the Program will incorporate both a high level of stakeholder participation and, as a central feature, science-based adaptive management. The Program includes a strong commitment to assure that its decisions and actions are based on sound science. To this end, the Program provides for comprehensive monitoring and data collection, and continuous and comprehensive scientific review of actions and decisions. The highest quality and credibility of science-based decision making will be assured by the integration in the Program of an independent board of scientific experts. In addition, the Program has hired a nationally-recognized scientist to coordinate the science effort, including related scientific studies conducted by CALFED Agencies.

Consistent with Proposition 204, prior to November 15, 2001 and each year thereafter, the CALFED Policy Group or its successor, in consultation with other interested persons and agencies, will review the CALFED Program's progress in meeting the implementation schedule in this ROD. The CALFED Policy Group or its successor will submit an annual report by December 15th to the Governor, the Secretary of the Interior, the State Legislature and the Congress that describes the status of implementation of all elements of the Program. The report will describe the status of all Stage 1 actions, including goals, schedules and financing agreements, taken to meet

CALFED objectives in the following areas:

- C Completion of key projects and milestones identified in the Ecosystem Restoration Program.
- C Development and implementation of local programs for watershed conservation and restoration.
- C Progress in improving water supply reliability and implementing the Environmental Water Account (see section 2.2.7 for Environmental Water Account).
- C Achievement of commitments under State and Federal Endangered Species Acts.
- C Implementation of a comprehensive science program.
- C Progress on storage projects, conveyance improvements, levee improvements, water quality projects, and water use efficiency programs.
- C Progress toward acquisition of the State and Federal permits, including Clean Water Act Section 404 permits, for implementation of projects in all identified program areas.
- C Progress in achieving benefits in all geographic regions covered by the Program.
- C Legislative action on water transfer, groundwater management, water use efficiency and governance issues.
- C Status of complementary actions.
- C Status of mitigation measures.
- C Revisions to funding commitments and program responsibilities.

If at the conclusion of each annual review, or if a timely annual review has not been issued, the Governor or the Secretary of the Interior determines that the schedule or objectives established in this ROD has not been substantially adhered to, the Governor and the Secretary, after notice to, and consultation with, State and Federal CALFED representatives, will prepare a revised schedule that ensures achievement of balanced solutions in all program areas consistent with the intent of this ROD and applicable regulatory compliance documents. Upon determination that the prior schedule has not been substantially adhered to, State funds, if the determination was made by the Governor, and Federal CALFED funds, if the determination was made by the Secretary of the Interior, will to the extent authorized be available for expenditure in the subsequent budget year only if a revised schedule has been developed within six months from the date on which the determination was made. Upon the submission of any revised schedule, funds will be expended in accordance with that revised schedule.

1.2 Purposes of This Record of Decision

This Record of Decision for the CALFED Bay-Delta Final Programmatic Environmental Impact Statement and Report (EIS/EIR) represents the culmination of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) processes. The ROD reflects a final selection of a long-term plan (Preferred Program Alternative), which includes specific actions, to fix the Bay-Delta, describes a strategy for implementing the plan, and identifies complementary actions the CALFED Agencies will also pursue.

For actions contained within the Preferred Program Alternative that are undertaken by a CALFED Agency or funded with money designated for meeting CALFED purposes, environmental review will tier from the Final Programmatic EIS/EIR. These actions will be carried out in a manner consistent with this ROD and incorporate the mitigation strategies contained in Appendix A to this ROD.

The Preferred Program Alternative is a set of programmatic actions, studies, and conditional decisions. It includes the broadly described actions that set the long-term overall direction of the Program. The description of the alternative is programmatic in nature, intended to help agencies and the public make decisions on the broad methods to meet program purposes. The Preferred Program Alternative description is an important legal element of compliance with CEQA and NEPA. The Preferred Program Alternative is not intended to define the site specific actions that will ultimately be implemented.

Whenever a broad environmental impact analysis has been prepared and a subsequent narrower analysis is then prepared on an action included within the entire program or policy, the subsequent analysis need only summarize the issues discussed in the broader analysis and incorporate discussions from the broader analysis by reference. This is known as tiering. Tiered documents focus on issues specific to the subsequent action and rely on the analysis of issues already decided in the broader programmatic review. Absent new information or substantially changed circumstances, documents tiering from the CALFED Final Programmatic EIS/EIR will not revisit the alternatives that were considered alongside CALFED's Preferred Program Alternative nor will they revisit alternatives that were rejected during CALFED's alternative development process.

Within the defined CALFED solution area, individual CALFED Agencies will implement actions that are part of CALFED's Preferred Program Alternative and will develop identified complementary actions, not part of the CALFED Program, which will help achieve CALFED goals and objectives. All actions will be subject to appropriate environmental review. Many of the complementary actions are not included in the CALFED Program because they were already underway when the CALFED effort was started in 1995. In those cases, CALFED programmatic actions have been designed to complement or supplement these existing actions and programs. Other actions will continue to be developed by individual CALFED Agencies over time. Because these new actions and programs are outside the programmatic analysis of impacts that CALFED has prepared, they are not the subject of final decision in this ROD. Implementation of all individual actions within the Preferred Program Alternative, complementary actions and new actions will be predicated on the appropriate level of environmental review, documentation and permitting.

In addition, many activities will be undertaken within the CALFED solution area by non-CALFED Agencies. By certifying the ROD, the CALFED Agencies do not intend to preclude implementation of projects not expressly evaluated in the CALFED Final Programmatic EIS/EIR. Nor do the CALFED Agencies intend to affect the ability of local communities to meet their individual water supply needs. Finally, nothing in this ROD is intended to, nor does, affect the regulatory responsibilities of individual CALFED Agencies.

This ROD recognizes that the CALFED Agencies have specific statutory and/or regulatory

authority and responsibilities, and that actions of these agencies must be consistent with applicable procedural and substantive requirements. Nothing in this ROD is intended to or shall have the effect of constraining or limiting any public entity in carrying out its statutory responsibilities. Nothing in this ROD constitutes an admission by any party as to the proper interpretation of any provision of law; nor is anything in this ROD intended to, nor shall it have the effect, of waiving or limiting any public entity's rights and remedies under any applicable law. Additionally, this document in no way supersedes the requirements of Executive Order 12322 or other Federal water policies and authorities.

The CALFED Agencies recognize that certain departments, boards, and commissions have adjudicative responsibilities with respect to contested matters that are brought before them. Such responsibilities include the requirement that the adjudicative entity and its members avoid bias, prejudice, or interest in the adjudicative matters before them; e.g., they cannot decide, before completion of any required hearing or equivalent proceeding, the outcome of a matter. Some such adjudicative entities exist within the undersigned CALFED Agencies. This ROD does not in any way require or commit an adjudicative entity to participate in proposing a project that will come before it for approval. Under this ROD, the role of adjudicative entities in connection with matters that may require an adjudicative decision is limited to promptly and diligently processing any applications, petitions, or other requests for approval. Nothing in this ROD commits an adjudicative entity to an approval or disapproval of any project subject to the authority of the adjudicative entity, nor to a term or condition in any approval of a project by the adjudicative entity.

1.3 Background/Historical Context

1.3.1 Bay-Delta Accord

Seeking solutions to the resource problems in the Bay-Delta, State and Federal agencies signed an agreement in June 1994 to (1) coordinate their actions to meet water quality standards to protect the Bay-Delta estuary; (2) coordinate the operation of the State Water Project (SWP); and the Central Valley Project (CVP) more closely with recent environmental mandates; and (3) develop a process to establish a long-term Bay-Delta solution to address four categories of problems; ecosystem quality, water quality, water supply reliability, and levee system vulnerability.

This agreement laid the foundation for the Bay-Delta Accord and CALFED. The Accord, formally called the Principles for Agreement on Bay-Delta Standards between the State of California and the Federal Government, detailed interim measures for both environmental protection and regulatory stability in the Bay-Delta. On December 15, 1994, the Accord was signed by State and Federal resource agencies, as well as by stakeholders representing many local water agencies and environmental organizations. Under the terms of a December 1999 extension, the Accord formally expires when this ROD is executed. Thereafter, the provisions in the Accord are replaced in their entirety by the provisions and agreements in this ROD and associated documents.

1.3.2 Mission Statement

Early in the Program development, CALFED Agencies developed and adopted the mission statement, objectives and solution principles to guide how the Program will be implemented. The mission statement, objectives and solution principles are shown in the following box. CALFED used these to shape the alternatives and will continue to use these objectives and principles as actions are implemented. Carrying out the mission, achieving the objectives, and adhering to the solution principles will ensure that CALFED fulfills its commitment to continuous improvement in all of the four problem areas.

MISSION STATEMENT

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

OBJECTIVES

CALFED developed the following objectives for a solution:

- C Provide good water quality for all beneficial uses.
- C Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- C Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system.
- C Reduce the risk to land use and associated economic activities, water supply, infrastructure and the ecosystem from catastrophic breaching of Delta levees.

SOLUTION PRINCIPLES

In addition, any CALFED solution must satisfy the following **solution principles**:

- C ***Reduce Conflicts in the System*** Solutions will reduce major conflicts among beneficial uses of water.
- C ***Be Equitable*** Solutions will focus on solving problems in all problem areas. Improvements for some problems will not be made without corresponding improvements for other problems.
- C ***Be Affordable*** Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.
- C ***Be Durable*** Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.
- C ***Be Implementable*** Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.
- C ***Have No Significant Redirected Impacts*** Solutions will not solve problems in the Bay-Delta system by redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

1.3.3 Four Interrelated Program Objectives

The CALFED Program takes a broad approach to addressing the four problem areas of water quality, ecosystem quality, water supply reliability and levee system integrity, recognizing that many of the problems and solutions in the Bay-Delta system are interrelated. Problems in any one program area cannot be solved effectively without addressing problems in all four areas at once. This greatly increases the scope of efforts but will ultimately result in progress toward a lasting solution.

Thus, the single most important difference between the CALFED Bay-Delta Program and past efforts to solve the problems of the Bay-Delta is the comprehensive nature of CALFED's interrelated resource management strategies. A comprehensive CALFED solution will also be supported by governance mechanisms that overcome problem-specific or resource-specific limitations of previous, more narrowly focused, approaches.

1.3.4 Summary of Process

There are three phases to the CALFED Bay-Delta Program:

Phase I - In Phase I, completed in September 1996, CALFED identified the problems confronting the Bay-Delta, developed the mission statement and guiding principles, and devised three preliminary categories of solutions for Delta water conveyance. In addition, CALFED identified three preliminary alternatives, representing differing approaches to conveying water through the Delta, to be further analyzed in Phase II.

Phase II - In Phase II, CALFED has completed the Final Programmatic EIS/EIR and issued this ROD. This includes development of the Preferred Program Alternative and development of the Plan of Action (see Section 2.2) focusing on the first seven years (Stage 1) following issuance of this ROD.

Phase III - Implementation will begin in Phase III. This period will include project-specific environmental review and permitting, as necessary.

During Phase I, CALFED held scoping meetings, technical workshops, public information meetings, and public BDAC workgroup meetings. The commitment to active public involvement continued through Phase II with additional public meetings, presentations before interested groups, media outreach, special mailings of newsletters, regularly updated information on the Program's web site, and a toll-free public information telephone line.

2. DECISION

2.1 National Environmental Policy Act/California Environmental Quality Act Decision

After reviewing the alternatives discussed in the Final Programmatic EIS/EIR and their predicted environmental, economic and social consequences, the CALFED Agencies select the Preferred Program Alternative as the best alternative for meeting the Program purposes. The Preferred Program Alternative provides a long-term plan to improve water quality, stabilize Delta levees, restore the ecosystem and provide water supply reliability.

The alternatives considered in CALFED's Programmatic EIS/EIR represent a reasonable range of alternatives for meeting the program purposes. The Preferred Program Alternative includes a set of broadly described programmatic actions in eight program areas (see Section 2.1.3).

2.1.1 Discussion of Alternative Selection Process

In Phase I, CALFED initiated a lengthy, inclusive public process to develop alternatives in order to accomplish its mission. The Phase I process developed alternatives in six steps: identify problems, define objectives, identify actions, develop solution strategies, assemble alternatives, and refine alternatives. Early in Phase I, the Program identified 50 categories of actions to resolve Bay-Delta problems and achieve Program objectives. These action categories were drawn from existing literature and participation from CALFED agencies, the Bay Delta Advisory Council, and numerous workshops with stakeholders and the general public. Within these categories, hundreds of individual actions were defined. The action categories represent the building blocks of the alternatives. In other words, each alternative is a combination of action categories reflecting differing approaches to achieving Program objectives and addressing solution principles.

As a way to manage the number of alternatives while still representing the full range of approaches to resolving problems, CALFED focused on the critical conflicts in the Bay-Delta system to help define an initial set of alternatives. These conflicts included the relationships between:

- C Fisheries and diversions
- C Habitat and land use and flood protection
- C Water supply availability and beneficial uses
- C Water quality and land use

Approximately 100 initial alternatives resulted from this focus. The initial alternatives varied in the level of effort applied to actions related to water use efficiency, water quality, ecosystem quality, and levee system integrity components.

Following evaluations and comments received at public meetings, workshops, and in writing, CALFED reached a number of conclusions regarding the makeup of each alternative:

The best possible source water quality is of paramount importance to urban water supplies. Agencies that deliver drinking water were very concerned about the cost of meeting future drinking water quality standards, as well as the technical challenges associated with treating source water of degraded quality. This suggests strong pollutant source control measures in every alternative.

Delta levees will be needed to protect agriculture, infrastructure, and habitat no matter how water is conveyed in the Delta. Delta levees protect many valuable features, including farms, habitat, infrastructure, and Delta water quality. Even if a new conveyance facility is built that protects water quality for some export users, adequate levee integrity will still be required to protect water quality, facilities and property in the Delta. This argues for a similar level of Delta levee protection in each alternative.

Ecosystem actions in the Program needs a single coherent vision of ecosystem restoration. The restoration of ecosystem functions and the recovery of Bay-Delta species likely will require diverse actions that will be extensive in scope. There is really no alternative to a single comprehensive plan for restoring ecosystem health. Adaptive management will be vital in guiding efforts to improve ecosystem quality. It is this adaptive management that will provide the needed flexibility in the Ecosystem Restoration Program.

Water use efficiency must be strongly pursued in all the alternatives. Water use efficiency will maximize use of existing supply to meet all needs and reduce the need for new storage. This suggests that water use efficiency measures should be implemented at a substantially increased level among all the alternatives.

The Program then refined the alternatives, which led to selection of a set of Phase II alternatives that was large enough to offer a reasonable range of solutions while small enough to allow for detailed analysis. Three basic alternative approaches developed in Phase I of the Program were carried into Phase II. Seventeen alternative configurations of the three basic alternative approaches were developed to further explore potential refinements for storage and conveyance in Phase II. Of the seventeen configurations, five were eliminated from further evaluation, and the environmental consequences of twelve of these were evaluated in the March 1998 Draft Programmatic EIS/EIR.

Based on public and agency comments on the March 1998 Draft Programmatic EIS/EIR and additional technical analysis, the Program was able to further refine and narrow the number of alternative solutions to the four evaluated in the July 2000 Final Programmatic EIS/EIR. Reasons for the elimination or consolidation of alternatives included technical deficiencies, creation of conditions damaging to the aquatic environment, higher costs relative to similarly performing

alternatives, and the lack of a south Delta conveyance improvement element. The Program has determined that the Program objectives cannot be met without some south Delta conveyance improvements.

The four alternatives evaluated in the Final PEIS/EIR, Alternatives 1, 2 and 3 and the Preferred Program Alternative, vary primarily in their approach to water conveyance. Three basic alternative approaches were formed around different configurations of Delta conveyance: existing system conveyance, modified through-Delta conveyance, and dual-Delta conveyance. Each approach includes the same set of actions for water use efficiency, water quality, levee system integrity, ecosystem quality, water transfers, and watersheds. A range of storage options was evaluated for each alternative to support these programs and the Delta conveyance, and to seek a balance between attainment of Program objectives and cost effectiveness. For further discussion of these alternatives and the No Action Alternative and a comparison of each of the alternatives to the Preferred Program Alternative see section 2.1.4 below.

A detailed description of the program alternative selection process can be found in Section 1.4 and Response to Comment document of the Final Programmatic EIS/EIR.

2.1.2 Public Comments

Comments Received on June 1999 Draft EIS/EIR

CALFED received and considered a wide variety of comments on the June 1999 Draft Programmatic EIS/EIR. The comments included:

- C Approximately 1,500 letters from individuals and organizations.
- C Approximately 800 individuals testified at one or more of sixteen hearings held around the State.
- C Approximately 2,400 pre-printed letters or postcards.

A total of approximately 11,000 individual comments were identified from these sources. CALFED Agencies prepared responses as part of the Final Programmatic EIS/EIR. A large percentage of the comments were general in nature and did not identify specific items from the Draft Programmatic EIS/EIR. Specific comments were categorized into 23 different areas of interest. Comments and responses can be found in the three volumes of the Response to Comments contained in the Final Programmatic EIS/EIR.

Comments Received on Final Programmatic EIS/EIR

Copies of the Final Programmatic EIS/EIR, including the responses to comments on the draft Programmatic EIS/EIR, were sent to all persons and public agencies who commented on the June 1999 Draft Programmatic EIS/EIR. As of August 28, 2000, CALFED received 411 letters on the Final Programmatic EIS/EIR. The decision makers have reviewed all of the letters commenting on the Final Programmatic EIS/EIR and considered this information as part of the process of preparing the ROD.

Many of the comments have been addressed in this ROD. For instance, the ROD addresses East Bay Municipal Utility District's comment on the source water for the Bay Area Blending Project and clearly articulates the CALFED Agencies' commitment that satisfactory resolution of fishery concerns is a prerequisite to implementation of a new Sacramento River diversion facility. The ROD also addresses the comment of Contra Costa Water District on implementation of Veale and Byron Tract projects in the South Delta. These are just a few examples of comments that have been addressed in the ROD.

Many comments repeat public comments on the Draft EIS/EIR that were addressed as part of the Response to Comments document in the Final Programmatic EIS/EIR. These included comments suggesting that the CALFED Program will forego or inappropriately influence existing regulatory processes. Several of the comments, similar to comments on the Draft EIS/EIR, reflect uncertainty/apprehension about the nature of some program element actions. As indicated in the Response to Comments document, these issues will be resolved as CALFED works with various stakeholders, agencies and local groups to further develop and implement the program element actions.

Several commenters asked for more time to provide additional comments on the Final Programmatic EIS/EIR and asked CALFED to hold a series of public hearings on the CALFED Program. The CALFED Agencies have accepted public comments on the Final Programmatic EIS/EIR from the date the Final Programmatic EIS/EIR was released to the public. This period will not be extended because of the desire to move forward into the project-specific implementation phase of the CALFED Program. Implementation of project-specific actions will involve additional environmental review as well as public involvement in the development of projects.

Many of the comments are project-specific; as such are beyond the level of detail of the Programmatic EIS/EIR and are not appropriate for a decision at this time. However, the concepts associated with the majority of the specific comments have been addressed in the Final Programmatic EIS/EIR and this ROD.

Comments indicated that local or directly affected individuals have not been given an adequate representation in the process and should be given opportunity to participate in all actions and shape decisions. The CALFED Program has been a collaborative effort. Public and agency involvement through outreach and education has been a focus of the CALFED Program since its

initial stages. These efforts have helped shape the CALFED Program, as well as develop the Programmatic EIS/EIR. For over five years, the Program has relied on continuous comments and involvement from individuals and groups who have a stake in finding long-term solutions for the problems affecting the Bay-Delta system. Participants representing rural, agricultural, municipal, and industrial water users; fishing interests; tribal governments; environmental organizations; businesses; and the general public have helped to define problems and evaluate alternatives to solve the challenges confronting the Bay-Delta system. To date, thousands of Californians have contributed to the Program by participating in public meetings and workshops—volunteering time, sharing expertise, and expressing ideas and opinions. Extensive opportunity for stakeholder participation, including participation by tribal governments, local government and affected individuals will continue to be provided as the Program moves forward.

CALFED's strategic approach for implementation includes working with stakeholders, agencies and local groups to further develop and implement the proposed actions. CALFED's strategic approach for implementation also includes staged implementation and staged decision making. The selection of a Preferred Program Alternative provides the broad resource framework and strategy for implementing a comprehensive Bay-Delta Program. The programmatic decision sets in motion the implementation of some actions, as well as additional planning and investigation to refine other actions. Throughout the implementation period, monitoring will provide information about conditions in the Bay-Delta and results of CALFED actions.

Many comments addressed the program plans released with the Final Programmatic EIS/EIR and not the environmental impact analysis contained within the Final Programmatic EIS/EIR. These comments were helpful in highlighting to the decision makers concerns commenters have about the program plans, but did not directly address the environmental impacts of the Program.

A comment regarding the Monterey Agreement questioned whether a response was misnumbered. The correct responses are IA-5.1-70, IA-5.1-128 and IA-2.2-5 rather than IA-5.1-108.

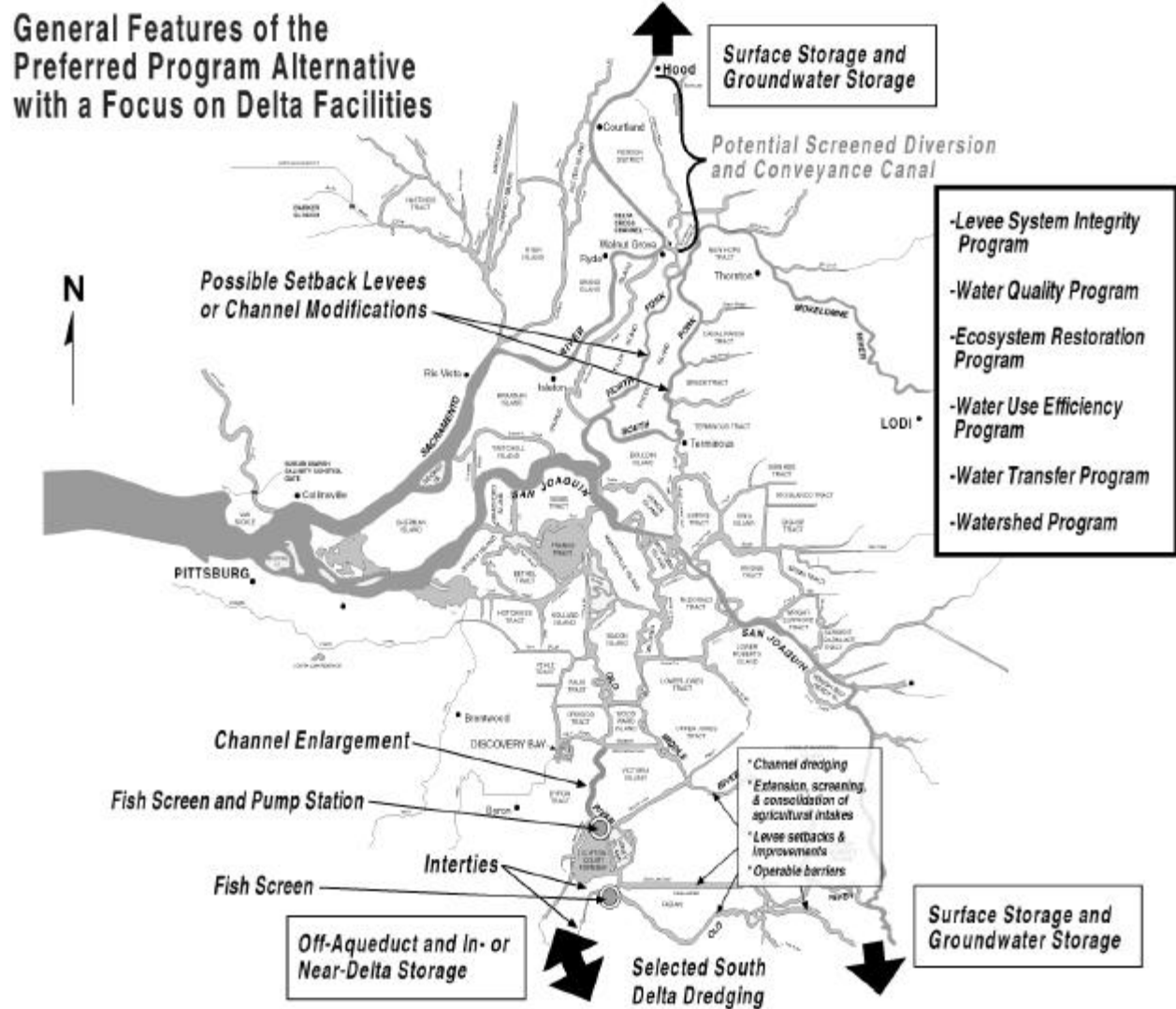
Lastly, several commenters indicated that the Framework contained activities not included in the Final Programmatic EIS/EIR and that the Framework should be integrated with the Final Programmatic EIS/EIR and the Record of Decision. The Framework described a strategy for implementing the Preferred Program Alternative and most actions described in the Framework are a part of the Preferred Program Alternative described in the Final Programmatic EIS/EIR. The Framework also identified complementary actions generally not analyzed in the Final Programmatic EIS/EIR intended to be pursued through further environmental review. Most actions. The complementary actions not analyzed in the Final Programmatic EIS/EIR are not subject to a final decision at this time. The Framework does not affect, in any way, the environmental analysis that was completed as part of the NEPA/CEQA process.

2.1.3 Preferred Program Alternative

The Preferred Program Alternative consists of a set of broadly described programmatic actions

which set the long-term, overall direction of the 30-year CALFED Program. The description is programmatic in nature, intended to help agencies and the public make decisions on broad methods to meet program purposes. The Preferred Program Alternative is made up of the Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program, Water Use Efficiency Program, Water Transfer Program, Watershed Program, Storage and Conveyance.

Actions described are intended to take place in an integrated framework and not independently of one another. While each program element is described individually, it is understood that only



through coordinated, linked, incremental investigation, analysis and implementation can we effectively resolve problems in the Bay-Delta system.

Levee System Integrity Program

The focus of the Levee System Integrity Program is to improve levee stability to benefit all users of Delta water and land. Actions described in this program element protect water supply reliability by maintaining levee and channel integrity. Levee actions will be designed to provide simultaneous improvement in habitat quality (consistent with the Ecosystem Restoration Program goals), which will indirectly improve water supply reliability. Levee actions also protect water quality, particularly during low flow conditions when a catastrophic levee breach would draw salt water into the Delta.

There are five main parts to the Levee System Integrity Program plus Suisun Marsh levee rehabilitation work:

- C Delta Levee Base Level Protection Plan - Improve and maintain existing Delta levee system stability to meet the Army Corps of Engineers PL 84-99 levee standard.
- C Delta Levee Special Improvement Projects - Enhance flood protection for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economics, infrastructure, etc.
- C Delta Levee Subsidence Control Plan - Implement current best management practices (BMPs) to correct subsidence adjacent to levees and coordinate research to quantify the effects and extent of inner-island subsidence.
- C Delta Levee Emergency Management and Response Plan - The emergency management and response plan will build on existing State, Federal, and local agency emergency management programs.
- C Delta Levee Risk Assessment - Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluate the consequences, and develop recommendations to manage the risk.
- C Suisun Marsh Levees - Evaluate, and where appropriate, rehabilitate Suisun Marsh levees.

Water Quality Program

The CALFED Program is committed to achieving continuous improvement in the quality of the waters of the Bay-Delta system with the goal of minimizing ecological, drinking water and other water quality problems. Improvements in water quality will result in improved ecosystem health, with indirect improvements in water supply reliability. Improvements in water quality also increase the utility of water, making it suitable for more uses and reuses.

The Water Quality Program includes the following actions:

- C Drinking water parameters - Reduce the loads and/or impacts of bromide, total organic carbon (TOC), pathogens, nutrients, salinity, and turbidity through a combination of measures that include source reduction, alternative sources of water, treatment, storage and if necessary, conveyance improvements such as a screened diversion structure (up to 4000

-
- cfs) on the Sacramento River between Hood and Georgiana Slough. The Conveyance section of this document includes a discussion of this potential improvement.
- C Pesticides - Reduce the impacts of pesticides through (1) development and implementation of BMPs, for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education and assistance in implementation of control strategies for the regulated pesticide users.
 - C Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs.
 - C Trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs.
 - C Mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
 - C Selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs.
 - C Salinity - Reduce salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies, and facilitate development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
 - C Turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay Delta and its tributaries.
 - C Low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.
 - C Toxicity of unknown origin - Through research and monitoring, identify parameters of concern in the water and sediment and implement actions to reduce their impacts to aquatic resources.

Ecosystem Restoration Program

The goal of the Ecosystem Restoration Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. In addition, the Ecosystem Restoration Program, along with the water management strategy, is designed to achieve or contribute to the recovery of listed species found in the Bay-Delta and thus achieve goals of the Multi-Species Conservation Strategy (MSCS). Improvements in ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions.

The Ecosystem Restoration Program identifies programmatic actions designed to restore, rehabilitate, or maintain important ecological processes, habitats, and species within 14 ecological management zones. Implementation of these programmatic actions will be guided by

six goals presented in the Strategic Plan for Ecosystem Restoration. Nearly 100 restoration objectives have been developed which are directly linked to one of the six goals. Each objective further defines the restoration approach for each ecological process, habitat, species or ecosystem stressor. One to several restoration targets have been developed for each objective to set more specific or quantified restoration levels.

Long-term implementation of the Ecosystem Restoration Program will be guided by the adaptive management approach described in the Strategic Plan for Ecosystem Restoration. This approach to restoration will require review by an ecosystem restoration science review panel and will rely on information developed in the Science Program.

Representative Ecosystem Restoration Program actions include:

- C Protecting, restoring, and managing diverse habitat types representative of the Bay-Delta and its watershed.
- C Acquiring water from sources throughout the Bay-Delta's watershed to provide flows and habitat conditions for fishery protection and recovery.
- C Restoring critical in-stream and channel-forming flows in Bay-Delta tributaries.
- C Improving Delta outflow during key periods.
- C Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of easements, and the construction and management of flood bypasses for both habitat restoration and flood protection.
- C Developing assessment, prevention and control programs for invasive species.
- C Restoring aspects of the sediment regime by relocating in-stream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams.
- C Modifying or eliminating fish passage barriers, including the removal of some dams, construction of fish ladders, and construction of fish screens that use the best available technology.
- C Targeting research to provide information that is needed to define problems sufficiently, and to design and prioritize restoration actions.

Water Use Efficiency Program

The Water Use Efficiency Program includes actions to assure efficient use of existing and any new water supplies developed by the Program. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing ecosystem benefits. Efficiency actions can also result in reduced discharge of effluent or drainage, improving water quality.

The Water Use Efficiency Program will build on the work of the existing Agricultural Water Management Council and California Urban Water Conservation Council process, supporting and supplementing those processes through planning and technical assistance and through targeted financial incentives (both loans and grants). The Water Use Efficiency Program has identified

potential recovery of currently irrecoverable water losses of over 1.4 million acre-feet of water annually by 2020 as a result of CALFED actions. Early in Stage 1, CALFED will identify measurable goals and objectives for its urban and agricultural water conservation program, water reclamation programs and managed wetlands programs.

Water conservation-related actions include:

- C Implement agricultural and urban conservation incentive programs to provide grant funding for water management projects that will provide multiple benefits which are cost-effective at the state-wide level, including improved water quality and reduced ecosystem impacts.
- C Identify, in region-specific strategic plans for agricultural areas, quantifiable objectives to assure improvements in water management.
- C Expand State and Federal programs to provide increased levels of planning and technical assistance to local water suppliers.
- C Work with the Agricultural Water Management Council (AWMC) to identify appropriate agricultural water conservation measures, set appropriate levels of effort, and certify or endorse water suppliers that are implementing locally cost-effective feasible measures.
- C Work with the California Urban Water Conservation Council (CUWCC) to establish an urban water conservation BMP certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures.
- C Help urban water suppliers comply with the Urban Water Management Planning Act.
- C Identify and implement practices to improve water management for wildlife areas
- C Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
- C Conduct directed studies and research to improve understanding of conservation actions.

Water recycling actions include:

- C Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- C Expand State and Federal recycling programs to provide increased levels of planning, technical, and financing assistance (both loans and grants) and to develop new ways of providing assistance in the most effective manner.
- C Provide regional planning assistance that can increase opportunities for the use of recycled water.

Water Transfer Program

The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a state-wide water transfer market. The framework also includes mechanisms to help provide protection from third party impacts. A transfers market can improve water availability for all types of uses, including the environment. Transfers can also help to match water demand with water sources of the appropriate quality, thus increasing the utility of water supplies.

The Water Transfer Program will include the following actions and recommendations:

- C Establish a California Water Transfer Information Clearinghouse to provide a public informational role. The clearinghouse would 1) ensure that information regarding proposed transfers is publicly disclosed and, 2) perform on-going research and data collection functions to improve the understanding of water transfers and their potential beneficial and adverse effects.
- C Require water transfer proposals submitted to the DWR, Reclamation, or the State Water Resources Control Board to include analysis of potential groundwater, socio-economic, or cumulative impacts as warranted by individual transfers.
- C Streamline the water transfer approval process currently used by DWR, Reclamation, or the State Water Resources Control Board. This would include clarifying and disclosing current approval procedures and underlying policies as well as improving the communication between transfer proponents, reviewing agencies, and other potentially affected parties.
- C Refine quantification guidelines used by water transfer approving agencies when they are reviewing a proposed water transfer. This will include resolving issues between stakeholders and approving agencies regarding the application of current agency-based quantification criteria.
- C Improve the accessibility of State and Federal conveyance and storage facilities for the transport of approved water transfers.
- C Clearly define carriage water requirements and resolve conflicts over reservoir refill criteria such that transfer proponents have a clear understanding of the implications of these requirements.
- C Identify appropriate assistance for groundwater protection programs through interaction with CALFED Agencies, stakeholders, the Legislature and local agencies. This is intended to assist local agencies in the development and implementation of groundwater management programs that will protect groundwater basins in water transfer source areas.
- C Establish new accounting, tracking, and monitoring methods to aid instream flow transfers under California Water Code Section 1707.

Watershed Program

The goal of the CALFED Watershed Program is to promote locally led watershed management activities and protections that contribute to the achievement of CALFED goals for ecosystem restoration, water quality improvement, and water supply reliability. The Program will accomplish these tasks by providing financial and technical assistance to local community watershed programs.

The Watershed Program includes the following elements:

- C Build local community capacity to assess and manage watersheds affecting the Bay-Delta system.
- C Develop local watershed assessment and management plans.
- C Fund development and implementation of specific watershed conservation, maintenance, and restoration actions identified in these plans.
- C Facilitate and improve coordination and assistance among government agencies and local watershed organizations.
- C Develop watershed program performance measures and monitoring protocols consistent with the CALFED Science Program.
- C Support resource conservation education at the local watershed level, and provide organizational and administrative support to watershed programs.
- C Identify the watershed functions and processes that are relevant to CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.

Storage

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all Program elements. Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the water management strategy (including the Integrated Storage Investigation), CALFED will continue to evaluate surface water and groundwater storage, identify acceptable project-specific locations, and initiate permitting, NEPA and CEQA documentation, and construction if all conditions are satisfied.

The total volume of new or expanded surface water and groundwater storage evaluated in the Final Programmatic EIS/EIR ranges up to 6 million acre feet, and surface storage facility locations being considered are located in the Sacramento and San Joaquin Valley and in the Delta. Those surface storage sites that will be pursued in Stage 1 are discussed in Section 2.2.5. New groundwater programs could be implemented statewide.

Conveyance

The Preferred Program Alternative employs a through-Delta approach to conveyance. Modifications in the Delta conveyance will result in improved water supply reliability, protection and improvement of Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees. The Preferred Program Alternative through-Delta conveyance facility actions include:

- C Construction of a new screened intake at Clifton Court Forebay with protective screening criteria.
- C Construction of either a new screened diversion at Tracy with protective screening criteria; and/or an expansion of the new diversion at Clifton Court Forebay to meet the Tracy Pumping Plant export capacity.
- C Implementation of the Joint Point of Diversion (see EWA Operating Principles Agreement in Attachment 2) for the SWP and CVP, and construction of interties.
- C Construction of an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.
- C Construction of operable barriers taking into account fisheries, water quality and water stage needs in the south Delta.
- C Operational changes to the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities.

Under the Preferred Program Alternative, north Delta improvements include:

- C Studying and evaluating a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in continuous improvements toward CALFED drinking water goals. Potential diversion sites between and including Hood and Georgiana Slough will be considered as part of this evaluation.

The diversion facility on the Sacramento River likely would include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The diversion facility on the Sacramento River is an action to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The assessments of the Delta Cross Channel and the diversion facility on the Sacramento River will be completed simultaneously. The results of all three of these evaluations will be shared with the Delta Drinking Water Council or its successor and the expert panel evaluating fish impacts of Delta conveyance. If these evaluations demonstrate that a diversion facility on the Sacramento River is necessary to address drinking water quality concerns and can be constructed without adversely affecting fish populations, initiate permit and environmental review to enable a decision on siting and construction of

a facility as a part of the Preferred Program Alternative.

- C Pursue construction of new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River.

The Preferred Program Alternative includes a process for determining the conditions under which any future additional conveyance facilities or water management actions would be taken. The process would include:

- C An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) total organic carbon.
- C An evaluation based on two independent expert panels' reports -- one on the Program's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery.

2.1.4 Discussion of Alternatives and Comparison to Preferred Program Alternative

No Action Alternative

The No Action Alternative is a description of the anticipated physical, CVP/SWP operation, and regulatory environment that would be in place in 2020 if the Program is not approved and implemented. Impacts of alternatives considered are compared to the No Action Alternative in order to highlight the changes to the environment that would take place as a result of implementing various alternatives.

Compared to the No Action Alternative and existing conditions, the Preferred Program Alternative provides significant improvements in terms of its ecosystem quality, water quality, water supply reliability, and levee system integrity effects. Under the No Action Alternative, each of these four areas of critical concern would continue to deteriorate. In addition, the quality of both in-Delta and export water likely would decline under the No Action Alternative. This decline in water quality would adversely affect irrigated agriculture, ecosystem health, fisheries, and drinking water quality. With the continued decline of the ecosystem, interruptions of water deliveries also likely would occur because of constraints on export pumping to protect threatened and endangered species. Finally, under the No Action Alternative, the Delta levees would continue to be vulnerable to failure because of limited maintenance in some locations and the lack of a comprehensive plan for effective emergency response. The No Action Alternative fails to meet the Program objectives and would result in significant adverse impacts on the health of fisheries, endangered species, species of special concern and their habitat, water quality, and other Bay-Delta resources.

Alternative 1

Under Alternative 1, Delta channels would be maintained essentially in their existing configuration. Several improvements would be made in the south Delta similar to those in the Preferred Program Alternative. The Preferred Program Alternative includes these south Delta actions but also includes actions in the north Delta such as channel modifications for improved water conveyance and flood control and the possible construction of a diversion facility on the Sacramento River. If the diversion facility is not constructed, the Preferred Program Alternative would be the most similar to Alternative 1.

Alternative 1, lacking north Delta channel improvements, would not provide as much flood control benefit in the Delta. Alternative 1 also does not have the potential for water quality improvement provided by the Preferred Program Alternative. The water quality improvement strategy for the Preferred Program Alternative is to aggressively implement the common programs and south Delta improvements, in Stage 1 of implementation, as proposed for Alternative 1. If these water quality objectives are not achieved, the diversion facility on the Sacramento River could be implemented, pending demonstration of benefits for water quality and resolution of fisheries concerns. This contingent action would improve Delta outflow, and decrease salinity and bromide for in-Delta and export water quality.

Alternative 1 would create slightly fewer construction- and facility-related impacts on visual resources, cultural resources, geology and soils, transportation, and air quality compared to the Preferred Program Alternative. Since Alternative 1 does not include a diversion facility on the Sacramento River, it would avoid the associated impacts on fisheries. However, the diversion facility would only be constructed and operated if adverse impacts on fish populations could be avoided. Consequently, the Preferred Program Alternative will not have greater adverse impacts on fish populations than Alternative 1.

Alternative 1 provides less operational flexibility than the Preferred Program Alternative and accordingly could result in fewer benefits to water supply reliability, and water quality. While Alternative 1 would substantially meet the Program's goals and primary objectives, Alternative 1 provides less operational flexibility and is less effective in meeting the Program objectives for water quality, water supply reliability and flood control as compared to the Preferred Program Alternative.

Alternative 2

Alternative 2 would employ a modified through-Delta conveyance approach. Significant improvements to north Delta channels, including construction of setback levees and channel dredging, and construction of a 10,000 cfs diversion from the Sacramento River to the Mokelumne River and associated fish protection facilities, would accompany the south Delta improvements contemplated under Alternative 1 and the Preferred Program Alternative.

The diversion would send greater volume and better quality water from the Sacramento River into the north Delta and east Delta. The diverted water would improve net-Delta outflow which helps to isolate the south Delta pumps from salinity intrusion and reduces the entrainment of San Joaquin River fish. The quality of in-Delta and exported water quality and would improve as compared to the Preferred Program Alternative.

However, Alternative 2 could result in significant adverse impacts on fisheries from the 10,000 cfs diversion facility. Fish mortality would increase as a result of reduced flow on the Sacramento River downstream of the diversion and greater proportion of fish entering Georgianna Slough and the Mokelumne River. Fish mortality would also increase from entrainment at the diversion. There is substantial uncertainty whether a facility as large as 10,000 cfs could be operated and screened sufficiently to avoid or minimize significant adverse effects on fish populations.

While the Preferred Program Alternative incorporates many of the benefits of Alternative 2 derived from north Delta channel modifications, there is uncertainty and concern that objectives for export and in-Delta water quality can be achieved with the common program elements and these actions. If water quality objectives not be met, the Preferred Program Alternative includes a diversion facility on the Sacramento River as a contingent measure to improve export water quality. The facility would have a capacity no greater than 4000 cfs which would substantially reduce impacts on fisheries, and would provide similar, but less pronounced, water quality improvement as Alternative 2. The diversion facility would only be constructed if it is determined that significant adverse impacts on fish populations can be avoided. Alternative 2 does not include this option. While Alternative 2 could meet the Program's goals and primary objectives to some extent, the water quality benefits of Alternative 2 are outweighed by greater technological uncertainty and adverse impacts on fisheries as compared to the Preferred Program Alternative. Accordingly, Alternative 2 is less effective in meeting the Program objectives.

Alternative 3

Alternative 3 would employ a dual-conveyance approach employing a combination of through-Delta improvements similar to the Preferred Program Alternative and an isolated diversion facility on the Sacramento River to take water by canal to the export facilities in the south Delta.

Initially, the dual-Delta conveyance approach with an isolated facility appeared to provide greater technical performance than the other alternatives. Some of the preliminary scientific and engineering evidence suggests that a dual-Delta conveyance configuration may improve export water quality and achieve fish recovery most effectively. Relative to the Preferred Program Alternative, Alternative 3 would improve export water quality and improve Delta flow patterns for fish migration, including reduced incidence of reverse flow and entrainment in the south Delta pumps.

However, other evidence indicates that such a conveyance configuration can cause significant in-Delta water quality problems. The diversion would substantially reduce the flow of the

Sacramento River below the diversion and could adversely affect fish migration and survival. The isolate facility would have a capacity between 5,000 cfs and 10,000 cfs. Higher capacity diversion would pose problems similar to Alternative 2. Additionally, construction-related impacts, land conversion and impacts from operation of the isolated facility, such as seepage, would be substantially greater under the Preferred Program Alternative.

In addition, during scoping and public meetings, many stakeholders and agencies voiced numerous concerns, including the difficulty of in ensuring the appropriate operation of such a facility, fear that an isolated facility will decrease the incentive to manage the Delta as a “common pool” in which export water supply is coupled with the preservation of the Delta, that decreased dependence on a on a through-Delta approach could undermine the commitment for balanced solutions involving maintaining Delta levees, improving in-Delta quality and pursuing ecosystem restoration.

For these reasons, Alternative 3 presents the most serious challenges in terms of cost, scientific uncertainty, assurances and implementation. While Alternative 3 may technically perform better for certain resource areas than the Preferred Program Alternative, it is not clear that the additional cost and risk associated with the isolated facility would be worth the benefits. Years of scientific evaluation would be necessary to determine whether an isolated facility would be needed to meet water quality, water supply reliability and fisheries objectives. At the earliest, evaluation, design and permitting the facility would take ten years. Lastly, the isolated facility is so contentious that stakeholder support for the Program would be significantly eroded. Such lack of support could threaten the viability of the entire Program.

The Preferred Program Alternative has a high likelihood of success in a shorter time period. The Preferred Program Alternative also has lower risk, is less controversial, and would require less modification of the environment than Alternative 3. Alternative 3 is rejected as infeasible due to social and technical considerations, based in large part due to the contentiousness and time associated with an isolated conveyance facility and the uncertainty that it will achieve the Program objectives any better than the Preferred Program Alternative.

2.1.5 Environmentally Preferable/Superior Alternative

As described above, the Preferred Program Alternative adopts a set of programmatic actions designed to achieve the objectives for each of the resource areas while evaluating the effectiveness of those actions, and assessing whether modifications may be needed to meet Program goals and objectives. Accordingly, the Preferred Program Alternative is the “Environmentally Preferable Alternative” under NEPA and the “Environmentally Superior Alternative” under CEQA.

The problems and potential solutions facing the Bay-Delta involve a complex set of interrelated biological, chemical, and physical systems. This complexity, coupled with the broad scope and number of actions needed to implement the Program, the 30-year or more implementation period,

the need to test hypotheses, and resource limitations make it necessary to implement the Program in stages. Consequently, the Preferred Program Alternative provides for implementation of the Program in a staged manner and establishes mechanisms to obtain the necessary additional information to guide the next stage of decision making.

The Preferred Program Alternative consists of a through-Delta conveyance approach, coupled with ecosystem restoration, water quality improvements, levee system improvements, increased water use efficiency, improved water transfer opportunities, watershed restoration, and additional surface waters and groundwater storage. The Preferred Program Alternative meets the Program's multiple purposes, reduces adverse environmental effects, and provides a system of research and monitoring to determine whether modifications or additional actions are needed. It provides multiple benefits, including but not limited to:

- C Modifying the timing and magnitude of flow to restore ecological processes and to improve conditions for fish, wildlife, and plants in the Bay-Delta system.
- C Improving and increasing aquatic and terrestrial habitats.
- C Modifying and eliminating fish passage barriers.
- C Constructing fish screens that use the best available technology.
- C Reducing the loads and impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity.
- C Reducing the impacts of pesticides.
- C Reducing the impacts of trace metals, mercury, and selenium.
- C Improving and maintaining the stability of the Delta levees and, after evaluation, appropriately improving and maintaining the Suisun Marsh levee system.
- C Enhancing flood protection for key Delta islands.
- C Expanding and implementing agricultural and urban conservation incentive programs.
- C Implementing better water management for managed wetlands.
- C Facilitating water transfers while protecting third parties from potentially significant adverse impacts.
- C Supporting local watershed restoration, maintenance, and conservation activities.
- C Developing appropriate groundwater and surface storage in conjunction with specified water conservation, recycling, and water transfer programs to provide water for the environment at times when it is needed most, and to improve water supply reliability.
- C Modifying existing Delta conveyance systems for improved water supply reliability and water quality, improved ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees.

Although the CALFED Agencies did not rule out the possibility of constructing an isolated conveyance facility in the future, they were mindful that, even if approved immediately following the ROD, such a facility could not be studied, approved, funded, and constructed within Stage 1 of implementation.

In light of the technical and feasibility issues discussed above, the CALFED Agencies propose to begin with through-Delta modifications. As part of the Preferred Program Alternative, the Program also would:

- C Continue to investigate storage opportunities in the context of the broader water management strategy.
- C Evaluate and implement storage projects, predicated on complying with all environmental review and permitting requirements. These efforts will be coordinated under CALFED's Integrated Storage Investigation.
- C Implement the Stage 1 of the Ecosystem Restoration, Water Quality, Water Use Efficiency, Water Transfers, Watershed, and Levee System Integrity Program Plans.
- C Monitor the results of these actions to determine whether an isolated conveyance facility as part of a dual-Delta conveyance configuration is necessary to meet the Program objectives.

If the Program purposes cannot be fully achieved with the actions proposed in the Preferred Program Alternative, additional actions including an isolated conveyance facility will need to be considered in the future. Until additional information is available to determine whether water quality objectives and fish recovery goals can be met and which, if any, additional actions will be necessary to achieve the Program goals and objectives, the Preferred Program Alternative is the best alternative to achieve overall project purposes and provide significant beneficial improvements over the conditions anticipated under the No Action Alternative, while establishing a process for obtaining this additional information. Moreover, the way the alternatives are structured, going forward with the Preferred Program Alternative does not preclude the Program's ability to undertake additional conveyance actions in the future, subject to appropriate environmental review.

2.1.6 Mitigation

Mitigation Measures Adopted

The Final Programmatic EIS/EIR sets out many potential mitigation measures (see Appendix A to this ROD) to be used during project-specific planning where appropriate. The CALFED Agencies will consider and adopt these measures when conducting second-tier environmental review. In addition to the mitigation measures identified at the programmatic level, the CALFED Agencies will also consider and adopt feasible mitigation measures intended to address project-specific impacts.

In considering effects from the CALFED Program together with effects of other similar projects, the cumulative impact analysis did not identify any additional effects that individually would be minor, but collectively significant. As a result, the analysis of the CALFED Program's contribution to cumulative effects is very similar to the analysis of its long-term effects. The

mitigation strategies identified for the CALFED Program effects are also applicable to mitigate the CALFED Program's cumulative effects.

Mitigation Measures Not Adopted

Generally, mitigation measures were not adopted in this ROD where they were inappropriate or not practicable. Specifically, a measure was not adopted where a mitigation measure is similar to a measure incorporated, a measure is less effective than a measure incorporated, a measure is ineffective for mitigating an adverse effect, a measure is too project-specific for a programmatic document, a measure addresses an impact that is not caused by the CALFED Program, a measure does not address an environmental effect or a measure is not practicable.

Appendix B to this ROD, incorporated herein, contains a list of mitigation measures not adopted and includes reasons why specific measures were not adopted.

Mitigation Monitoring Plan

Projects and activities that implement the CALFED Preferred Program Alternative will be monitored to ensure that mitigation strategies developed in the Final Programmatic EIS/EIR are considered, adopted and implemented. CALFED Agencies will use this mitigation monitoring plan for projects that are within the scope of the Final Programmatic EIS/EIR and carried out or funded by CALFED Agencies as part of the CALFED Program. If and when a new governing agency with authority to carry out CALFED projects is created, this plan would apply to that new agency as well.

Projects and activities implementing the Preferred Program Alternative will undergo future environmental analysis tiering from the Final Programmatic EIS/EIR. In order to qualify for CALFED funding, any implementing project must demonstrate its compliance with this mitigation monitoring plan. As part of these second-tier environmental reviews, the lead agency for each of these projects will use the mitigation strategies (see Appendix A to this ROD) as a starting point to determine appropriate mitigation measures. Because all the potential actions and impacts for tiered projects cannot be anticipated at a programmatic level, each project needs to select those strategies and actions applicable to the specific location and type of action and to consider additional project-specific mitigation measures.

The mitigation monitoring plan includes review, guidance, and reporting components. The CALFED Agencies will prepare a checklist of the mitigation strategies (Appendix A to this ROD) to provide guidance to lead agencies preparing environmental documents that tier from the Final Programmatic EIS/EIR. The lead agencies for second tier documents will note which applicable programmatic mitigation strategies are being adopted and explain why others are not. They will provide a schedule for implementing the adopted mitigation measures, and for reviewing the implementation of those measures. The lead agencies will provide a written report periodically,

but at least once a year to the CALFED Agencies for programmatic review by the lead scientist as to the overall progress in implementing the mitigation measures and the efficacy thereof. A summary of this information will be included in the annual report described in Section 1.1.

2.2 Plan for Action

2.2.1 Governance

Through five years of planning, the CALFED *process* for implementing the Program has assumed an importance virtually equal to the CALFED *actions*. Stakeholders often raise concerns about their role in implementation or about how a particular action will be implemented. This section briefly describes the CALFED Agencies' plan for addressing interim as well as long-term governance issues.

Interim Process

The CALFED Agencies have executed a memorandum of understanding (Attachment 3 to this ROD) that establishes the process for governing implementation of the CALFED Program until the Legislature and Congress establish a new governing structure. The Implementation MOU does not create a new entity or modify existing agency authority. Instead, it identifies the agencies that will lead implementation of each Program element and establishes the CALFED Policy Group as the oversight and coordination body for CALFED implementation.

Long-Term Proposal

After nearly a decade of slow but tangible progress toward shared decision-making and funding, the CALFED Agencies will work with the State Legislature and the Congress to develop legislation for a permanent joint Federal-State commission with shared power to appoint commission members. This approach will require resolution of Federal Constitutional concerns. The new commission would provide direction and oversight in implementing the long-term plan described in this document and the Final Programmatic EIS/EIR. A joint commission made up of high-level appointees would maintain visibility inside and outside the government, assure agency coordination, help secure funding, and provide policy leadership and accountability.

Major responsibilities of the Commission would include: reviewing and approving program priorities and budget proposals; assessing and reporting on progress toward program goals; coordinating within CALFED and with related programs to maximize resources and reduce conflicts; resolving disputes among CALFED Agencies; and maintaining contact with and receiving communications from the public and the media, as well as Congress and the California Legislature. The overarching mandate of the Commission would be to assure effective, balanced

and coordinated implementation in all program areas.

The Commission should be composed of equal numbers of high level officials of the Federal and State agencies responsible for implementing CALFED programs and a similar number of stakeholder and tribal representatives. This structure is generally consistent with the recommendation of the Bay-Delta Advisory Council. For example, the Commission could have 12 members, as follows: four Federal members - from among the U.S. Environmental Protection Agency (EPA), Natural Resources Conservation Service (NRCS), U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS)/National Oceanic and Atmospheric Administration (NOAA), Reclamation, U.S. Fish and Wildlife Service (USFWS); four State members - California Department of Fish and Game (DFG), California Department of Water Resources (DWR), California Environmental Protection Agency (CalEPA), Resources Agency; and four other members, representing rural/agricultural water user communities, urban water user communities, environmental advocates and tribes. This structure would ensure a close relationship between the Commission, CALFED Agencies, and the stakeholder community.

As described in Attachment 3, the Commission would be assisted by an advisory committee whose members would include representatives of Indian tribes, local governments and stakeholder groups, including environmental justice representatives. The advisory committee members would be selected based on their experience and expertise in relevant fields, such as ecosystem restoration, agriculture, hydrology, urban water management, fishery biology, water quality, flood management, water conservation and recycling, and economics. Appointments would be made to assure that the advisory committee as a whole is both balanced and diverse. Representatives of CALFED Agencies would attend advisory committee meetings and provide information and updates to the committee.

Implementation Commitments

Local Leadership. The CALFED Agencies will rely on leadership in local communities across the State to provide advice and support for implementing CALFED projects affecting their communities.

Stakeholder Consultation. The CALFED Agencies will continue to solicit and incorporate diverse stakeholder perspectives into its decisions and actions as they implement the CALFED Program. The Secretary of the Interior will charter a new Federal advisory committee and will consult with the Governor regarding membership of the new committee.

Environmental Justice. Consistent with Federal and State authorities including Federal Executive Order 12898, Title VI of the Civil Rights Act of 1964 and recent State legislation, the CALFED Agencies are committed to addressing environmental justice challenges related to the management of water in the Bay-Delta watershed. For example, it is important to examine the potential effects of water management reforms on rural

communities and the public health and financial impacts of ERP and Water Quality Program actions on the large numbers of minorities and disadvantaged people living in urban as well as rural areas. The CALFED Program and its participating agencies are committed to seeking fair treatment of people of all races, cultures, and incomes, such that no segment of the population bears a disproportionately high or adverse health, environmental, social or economic impact resulting from CALFED's programs, policies, or actions. The CALFED Agencies will be responsible for ensuring this policy is carried out across all program areas through the development of environmental justice goals and objectives.

By the end of December 2000, the CALFED Agencies will collaborate with environmental justice and community stakeholders to develop a comprehensive environmental justice workplan across all program areas. This workplan will ensure that the CALFED Agencies develop the capacity and process to understand, monitor, and address environmental justice issues as the program moves into implementation, including identifying and developing specific methods to address and mitigate environmental justice impacts. This workplan should, at a minimum, include commitments such as the development of environmental justice goals and objectives for each program area, investments in staff and resources across program areas and agencies, development and implementation of an environmental justice education program for agency and program staff, collection and analysis of additional demographic information to assist in the identification of impacts, and actions to ensure effective participation on technical and advisory workgroups by those populations adversely impacted.

Tribal Consultation. Consistent with the President's April 29, 1994, Memorandum, the CALFED Agencies will assess the impact of CALFED project-specific plans, projects and activities on tribal trust resources and tribal government rights and concerns. The CALFED Agencies will actively engage federally recognized tribal governments in the planning and development of specific projects in their areas and will consult with such tribes on a government-to-government basis, to the greatest extent practicable and to the extent permitted by law, prior to taking actions that affect such tribal governments. At the request of any tribal government, the CALFED Agencies will enter into a Memorandum of Understanding with that tribal government or multiple tribal governments that will specify the process for how the federal, state and tribal governments will work together, on a government-to-government basis, in developing CALFED projects.

Land Acquisition. Successful implementation of the CALFED Program will affect some agricultural lands. As an important feature of the State's environment and economy, agricultural lands will be preserved during implementation of the Program in a manner consistent with meeting program goals, minimizing impacts to agriculture. Some of the land needed for program implementation is already owned by the Federal or State government and that land will be used to achieve program goals. Partnerships with landowners, including easements with willing landowners, will be pursued to obtain mutual benefits if public land is not available for the intended purpose. Acquisition of fee

title to land will be from willing sellers only, and will be used when neither available public land nor partnerships are appropriate or cost-effective for the specific need. Such acquisitions will consider the potential for third-party and redirected impacts. In addition, to the maximum extent possible, the CALFED Agencies will seek to implement the Program through technical and financial assistance to locally based, collaborative programs such as the Sacramento River Conservation Area/SB 1086 program.

CALFED Agency Coordination. The CALFED Bay-Delta Program has established an important precedent in coordinated and cooperative State and Federal agency relationships. These improved institutional relationships are expected to extend to other programs in which these agencies continue to have roles. Other programs include those developed to address statewide water supplies and demands.

Integration of Non-Signatory Agencies. The CALFED Agencies intend to work with Federal and State agencies that implement other programs that relate to CALFED's mission. While these agencies will not serve as part of the governing structure or incorporate their programs into CALFED, the CALFED Agencies will coordinate their implementation of the CALFED programs with these non-CALFED programs. The CALFED Executive Officer and staff will coordinate with the other agencies' programs and identify conflicts as soon as possible. In some cases, CALFED Agencies or a successor agency may establish contractual relationships with non-CALFED Agencies to implement certain CALFED programs.

Environmental Documentation. The CALFED Agencies will fulfill their respective legal responsibilities for environmental analysis, documentation and permitting pursuant to NEPA, CEQA and all other environmental laws. As indicated below, the CALFED Agencies and/or the new CALFED Commission will complete the necessary programmatic and project-specific analysis of programs and projects.

Permit Clearinghouse. The CALFED Agencies will establish a clearinghouse for obtaining the necessary permits and approvals for CALFED Program implementation. This permit clearinghouse will be established by December 2000.

Adaptive Management/Science. The CALFED Agencies will use science-based adaptive management in the implementation of the CALFED Program.

Beneficiaries Pay. A fundamental philosophy of the CALFED Program is that costs should, to the extent possible, be paid by the beneficiaries of the program actions.

Compliance With Water Rights Laws. The CALFED Agencies will comply with California's water rights laws, including area-of-origin statutes, applicable to their respective actions. Nothing in this ROD is intended to affect existing water rights or water right holders. In the few areas where CALFED Agencies may propose changes to California law (e.g., transfers, appropriate water use measurement), the CALFED

Agencies will work with all interested parties potentially affected by such changes in developing legislative proposals.

Project Operations. In order to promote more efficient water project operations, the operators of the State Water Project (SWP) and Central Valley Project (CVP) will continue to meet regularly with the fishery agencies through the CALFED Operations Group (Ops Group) which has been re-established in the Implementation MOU.

Coordinated Operation Agreement. DWR and Reclamation intend to modify the 1986 CVP/SWP Coordinated Operation Agreement (COA) in order to reflect the many changes in regulatory standards, operating conditions and the EWA. DWR and Reclamation will commence renegotiation of the COA by the middle of 2001.

2.2.2 Ecosystem Restoration

The CALFED Agencies will implement a comprehensive Ecosystem Restoration Program (ERP) throughout the Bay-Delta's watershed, consistent with the Strategic Plan for Ecosystem Restoration. The goal of the ERP is to improve aquatic and terrestrial habitats and natural processes to support stable, self-sustaining populations of diverse and valuable plant and animal species through an adaptive management process. Implementation of the ERP includes recovery of species listed under the State and Federal Endangered Species Acts.

Actions Included in the Programmatic EIS/EIR

To achieve its objectives, the ERP identifies over 600 programmatic actions in all the regions of the Bay-Delta watershed. CALFED's ERP will undertake the following actions using a science-based adaptive management framework, consistent with the ERP Strategic Plan and on-going scientific review. Additional information on the ERP Science Program can be found in the ERP Strategic Plan. The actions listed here are explained in greater detail in Volumes I and II of the ERP and in the ERP Strategic Plan. ERP actions include, but are not limited to:

- Implement large-scale restoration projects on selected streams and rivers including Clear Creek, Deer Creek, Cosumnes River, San Joaquin River and Tuolumne River, in cooperation with local participants.
- Improve fish passage through modifications or removal of the following locally owned dams: small diversion dams on Butte Creek; eight Pacific Gas & Electric Company diversion dams on Battle Creek; McCormick-Saeltzer Dam on Clear Creek; Woodbridge Dam on Mokelumne River; and Clough Dam on Mill Creek. CALFED Agencies will support studies to determine if introduction of wild chinook salmon and steelhead to the upper Yuba River watershed is biologically, environmentally, and socio-economically feasible over the long term and will recommend other fish passage projects through the

Integrated Storage Investigation (ISI). Local interests will participate in implementing these actions, with funding shared by CALFED Agencies and the local interests, based on individual circumstances.

- Restore habitat in the Delta, San Pablo Bay, Suisun Bay and Suisun Marsh, and Yolo Bypass including tidal wetlands and riparian habitat. In addition, 8,000 to 12,000 acres of wildlife-friendly agricultural lands will be established during Stage 1, in cooperation with local participants.
- Restore habitat and hydraulic needs on Frank's Tract in the Delta to optimize improvements in ecosystem restoration, levee stability, and Delta water quality. CALFED Agencies will decide the scope and feasibility of the project by 2002, and begin implementation by the end of Stage 1.
- Improve salmon spawning and juvenile survival in upstream tributaries as defined by the ERP and Strategic Plan, by purchasing up to 100 TAF per year by the end of Stage 1. Some of these ERP flows may contribute to the EWA.
- Complete protection and restoration of the Sacramento River meander corridor as part of the Sacramento River Conservation Area/SB 1086 program, including easement or purchase of an additional 15,000 acres, revegetation, and restoration of stream meander function by the end of Stage 1.
- Implement an invasive species program, including prevention, control and eradication.
- Assess the potential need for additional fish contamination monitoring and consumption advisories in the Bay-Delta watershed. If gaps are found, fund additional monitoring, testing, analysis, outreach, pollution prevention, and implementation of best management practices, as appropriate, by the end of Stage 1.
- Assist existing agency programs to reduce turbidity and sedimentation; reduce the impairment caused by low dissolved oxygen conditions; reduce the impacts of pesticides including organochlorine pesticides; reduce the impacts of trace metals; mercury; and selenium; reduce salt sources to protect water supplies; and increase understanding of toxicity of unknown origin.
- Improve dissolved oxygen conditions in the San Joaquin River near Stockton. The dissolved oxygen in the San Joaquin River, in the vicinity of Stockton, dips below State environmental criteria, causing a migratory block for salmon and threatening other fish. CALFED proposes simultaneous investigation of specific causes as well as investigation of innovative methods to reduce problem pollutants in the river. Proposition 13 includes \$40 million to construct facilities as part of this effort. Actions include:

S Finalize investigation of methods to reduce constituents that cause low dissolved

oxygen by the end of 2001 to be included in the Total Maximum Daily Load recommendation to the Central Valley Regional Water Quality Control Board (CVRWQCB).

- S Finalize State Basin Plan Amendment and Total Maximum Daily Load for constituents that cause low dissolved oxygen in the San Joaquin River by the end of June 2002.
- S Begin implementation of appropriate source controls and other controls as recommended in the Total Maximum Daily Load by the end of 2002.

Single Blueprint for Restoration and Recovery: MSCS-ERP Milestones

The CALFED Agencies will establish, through the ERP and the MSCS, a single blueprint for restoration and species recovery within the geographic scope of the CALFED ERP. The ERP is the Program's blueprint for restoration of the Bay-Delta. The MSCS is not a separate blueprint or supplemental restoration program and does not supplant the ERP. The measures and goals in the MSCS are derived from, or are consistent with, the ERP's measures and goals.

The ERP will be informed by the Science Program, which will monitor and evaluate the implementation of the ERP actions and conduct pertinent research. The ERP and the Science Program are important for Federal Endangered Species Act (FESA), California Endangered Species Act (CESA) and Natural Community Conservation Plan (NCCP) compliance, and are integral to the MSCS. To ensure that the ERP is implemented in a manner and to an extent sufficient to sustain programmatic FESA, CESA and NCCP compliance for all program elements, USFWS, NMFS, and DFG have developed MSCS-ERP Stage 1 Milestones. USFWS, NMFS, and DFG have concluded, based on the best information currently available, that the MSCS-ERP Milestones, if achieved as specified in the Programmatic Regulatory Determinations, define a manner and level of ERP implementation in Stage 1 sufficient to achieve the MSCS's species goals. USFWS, NMFS, and DFG expect and intend that the MSCS-ERP Milestones will be achieved with annual ERP funding of \$150 million, as described below (see Funding).

To ensure that substantial progress in being made to achieve the MSCS-ERP Milestones, the USFWS, NMFS, and DFG will participate in an annual process with the ERP and Science Programs to: 1) develop annual and long-term ERP implementation priorities and strategies; 2) develop annual implementation plans; and 3) assess the implementation and performance of ERP actions, including measuring progress towards achieving the MSCS-ERP Milestones. USFWS, NMFS, and DFG expect that the MSCS-ERP Milestones may be revised to reflect new information derived in the process.

Funding

In Stage 1, CALFED plans to invest over \$1 billion in ERP projects, in accordance with the priorities established in the Strategic Plan, in addition to funds necessary for the EWA. To be

successfully implemented, the ERP must have at least \$150 million from dedicated funding sources annually through Stage 1. (There may be many ways to achieve this.) An additional \$50 million will be required annually for the EWA for the first four years. It is anticipated that additional funding to support the EWA will be needed beyond the first four years. To the extent that the EWA acquires a share of new storage and conveyance projects, the need for EWA funding for annual acquisitions of water will be reduced. The level of assets required to support continuation of the EWA beyond the first four years will be evaluated and will be included in a revised biological opinion.

For the ERP, the CALFED Agencies propose a combination of State funding (including Proposition 204 funds), Federal funding, and user fees. Consistent with this proposal, the State has allocated over \$173 million in FY 2000-2001, including \$100 million from Proposition 204, \$35 million from the general fund, \$25 million from Proposition 13, and \$13 million from Proposition 12. Additionally, through FY 2000, Federal funds in the amount of \$190 million have been provided through Reclamation. During the first years, State and Federal funds would provide the bulk of funding, supplemented by approximately \$15 million of Central Valley Project Improvement Act (CVPIA) Restoration Funds, and SWP contributions under the Four Pumps Agreement. Following issuance of this ROD, the CALFED Agencies will work with local interests to develop State legislation to create a broad-based user fee that will generate approximately \$35 million annually. The CALFED Agencies also will consider the availability of Federal funds. By the end of Stage 1, CALFED will reevaluate the level of dedicated annual funding from State, Federal, and user sources to achieve the ERP goals.

Complementary Action

The Framework identified the following action which was not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review.

- C Implement integrated flood management, ecosystem restoration and levee restoration under the Sacramento/San Joaquin River Basins Comprehensive Study being prepared by the USACE and California Reclamation Board. Significant elements of this Comprehensive Study, when implemented, will further the purposes of the ERP. The CALFED Agencies intend that final development and implementation of actions under the Comprehensive Study will be coordinated and consistent with the CALFED Bay-Delta Program.

In addition to the ERP actions funded through CALFED, ongoing State and Federal commitments to fish and wildlife restoration will continue and will supplement the achievement of the CALFED objectives and activities. These programs include CVPIA and Four Pumps Agreement among others.

2.2.3 Watersheds

The goal of the CALFED Watershed Program is to promote locally led watershed management activities and protections that contribute to the achievement of CALFED goals for ecosystem restoration, water quality improvement, and water supply reliability. The CALFED Agencies will encourage and support local efforts to resolve issues throughout watersheds in the solution area (both above and below the primary tributary dams). The CALFED Program will support local implementation with funding, coordination, and technical assistance. CALFED proposes investing \$300 million in this watershed program in Stage 1.

Watershed plans and actions will be developed to achieve multiple objectives: improved water supply reliability, flood management, environmental restoration, and water quality. For example, the Watershed program anticipates providing assistance to community based organizations in the American River watershed. Current efforts underway in this watershed are focused on forest and fuels management issues, and reducing the threat of catastrophic wildfire. Addressing these issues on a watershed scale can result in reduced water quality impacts and increased aquatic and terrestrial habitats for important species of concern.

Actions Included in the Programmatic EIS/EIR

The major Stage 1 elements of the Watershed Program include:

- C** Establishing a grant program in the first year to solicit, evaluate and fund local projects that contribute to achieving CALFED goals. The watershed activities targeted by this program will:
 - S** Build local capacity to assess and manage watersheds affecting the Bay-Delta system.
 - S** Develop watershed assessments and management plans.
 - S** Fund development and implementation of specific watershed conservation, maintenance and restoration actions.

The CALFED Watershed Program has designed a three-step process for soliciting, evaluating and selecting an initial set of demonstration watershed projects: 1) solicitation of watershed projects that meet Program's selection criteria; 2) further proposal development by CALFED staff, the Watershed Workgroup, and an Interagency Watershed Advisory Team; and 3) evaluation and selection of proposals. CALFED's criteria for selecting projects will be based on the following:

- S** A balance of diverse watershed activities that demonstrate the potential to improve the Bay-Delta system.
- S** Application to multiple CALFED objectives in an integrated fashion, with emphasis on water supply reliability, water quality, and levee stability.

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- S A variety of watershed settings, such as forest lands, agricultural, urban, mixed, etc., are represented.
 - S Geographical distribution throughout the CALFED solution area.
 - S Project costs and anticipated results.
- C Developing watershed program performance measures and monitoring protocols consistent with the CALFED Science Program by the end of 2002.

Local Leadership

Building local consensus about management of individual watersheds is particularly important to the watershed program. CALFED Agencies are therefore committed to fostering the development of local watershed groups that include adjacent landowners, community members (particularly representatives from traditionally under-represented groups), environmental advocacy groups and locally-involved public agencies (Federal, State and local).

2.2.4 Water Supply Reliability

One of the primary goals of CALFED is to improve the reliability of California's water supply within the context of unpredictable hydrology and the competing needs of fish and wildlife and water users. In addition to hydrology, actions taken in Stage 1 assume that water supply reliability is predicated upon the following factors:

- C Clear and consistent implementation of all regulatory decisions and project operations.
- C Flexibility, water use efficiency and interagency cooperation to avoid water supply/fish/water quality conflicts where possible.
- C Investment in infrastructure to improve storage and conveyance capacity.

Actions Included in the Programmatic EIS/EIR

Actions initiated in the first four years of Stage 1 to improve storage and conveyance capacity (see following sections on Storage and Conveyance) will substantially increase water supply reliability in the later years, but these benefits will not be realized until the new facilities come on line. Similarly, it will take years to implement and fully realize the water supply benefits of water use efficiency, recycling and other conservation measures. Therefore the greatest challenge to improving water supply reliability lies in the first four years of Stage 1.

To address these water supply reliability challenges in this period, CALFED Agencies are taking the following actions in this ROD:

- C Establishing an EWA with an average of 380 TAF of water set aside annually in the first years to provide additional water for fishery purposes beyond the regulatory baseline. Water assets will be acquired by CALFED Agencies, consistent with the goals of the

CALFED Water Transfer Program.

- C Establishing a Regulatory Baseline by delineating existing regulatory requirements and clarifying implementation of specific regulatory actions (see EWA Section).
- C Providing a commitment that there will be no reductions, beyond the baseline regulatory levels described below, in CVP or SWP Delta exports to State and Federal project water users resulting from measures to protect fish. This commitment will initially be provided for the first four years of Stage 1, as outlined in the MSCS Conservation Agreement (see Attachment 5 to this ROD).

In addition, CALFED Agencies will take the following actions in Stage 1:

- C Seek SWRCB approval of Joint Point of Diversion and share water derived from Joint Point of Diversion between the CVP and the EWA.
- C Implement conjunctive management projects, water conservation measures and water transfers, as described in the sections below.
- C Allocate Proposition 13 funds dedicated to interim water supply reliability and water quality.

Proposition 13 contains over \$630 million for these purposes, including the following:

- S \$200 million for groundwater storage projects.
- S \$250 million for Stage 1 water quality actions and water management actions.
- S \$180 million for water supply and water quality infrastructure projects in areas that draw supplies from the Delta.

In the first four years of Stage 1, it is anticipated that water deliveries will remain at recent levels for most water users who depend upon water from the CVP, including Exchange Contractors, North of Delta CVP agricultural contractors, refuges, and M&I contractors, as well as for SWP contractors and non-project water users. It is also anticipated that implementation of Joint Point of Diversion, operational flexibility, interagency cooperation, EWA implementation, and other cooperative water management actions (some of which may require further specific environmental review) will result in normal years in an increase to CVP south-of-Delta agricultural water service contractors of 15 percent (or greater) of existing contract totals to 65 to 70 percent. This normal year supply improvement may not be achieved in all years due to annual hydrologic variability and its impact on carryover storage conditions. Substantial progress toward implementation of other program elements, such as development of EWA assets, is also necessary. Water supplies in dry years are likely to be less than the anticipated amounts and more in above normal years. As discussed in this ROD, CALFED Agencies are committed to working with local agencies to implement these regional supply actions and to support local water management actions including conservation and other local measures. Part of this effort will include development of a plan for alternative refuge supplies and conveyance.

The Secretary of the Interior is expected to make a decision later this year on Trinity River flows

pursuant to the original Trinity authorization, the Trinity Restoration Act of 1984, and the CVPIA. The substance of that decision is unknown and therefore cannot be addressed at this time. It is separate from and will not be affected by this ROD. Certain CALFED Agencies have considered the potential that the Trinity River decision may affect CVP allocation and have concluded that it will not affect the allocations to CVP south-of-Delta agricultural water service contractors described immediately above.

Complementary Action

The Framework identified the following action which was not analyzed in the Final Programmatic EIS/EIR.

- C Governor's Drought Contingency Plan.** CALFED Agencies recognize that in the next several years critical water shortages may occur that severely impact the health, welfare and economy of California. To avoid such serious impacts, the Governor has convened a panel, chaired by the Director of DWR, for the purpose of developing a contingency plan to reduce the impacts of critical water shortages primarily for agricultural and urban water users. The plan will identify all available resources (e.g., water transfers, water exchanges, groundwater programs, local partnerships), building upon the experience gained with Governor's Drought Water Bank, to minimize such shortages. The plan also will recommend appropriate funding mechanisms. In addition, CALFED Agencies commit to facilitate transfers of water and expedite regulatory processes to assist in implementation of the plan consistent with legal requirements. The Governor's Panel will submit the plan to the Governor by December 2000.

2.2.5 Storage

Expanding water storage capacity is critical to the successful implementation of all aspects of the CALFED Program. Not only is additional storage needed to meet the needs of a growing population but, if strategically located, it will provide much needed flexibility in the system to improve water quality and support fish restoration efforts. Water supply reliability depends upon capturing water during peak flows and during wet years, as well as more efficient water use through conservation and recycling.

Actions Included in the Programmatic EIS/EIR

The Program identified actions that will be pursued in Stage 1 to expand storage capacity at existing reservoirs and strategically located off-stream sites by approximately 950 TAF, and to implement a major expansion of more environmentally sensitive groundwater storage for an additional 500 TAF to 1 MAF. CALFED Agencies are committed to increasing storage through the development of acceptable projects described below. Storage projects are not developed in

isolation but rather as part of an overall water management strategy. As such, storage combined with other program actions such as conservation, transfers and habitat restoration will contribute to and be compatible with the water supply reliability, water quality and ecosystem restoration program objectives. For example, storage projects must be constructed and operated in a manner that is consistent with CALFED's water quality goal of continuous improvement in Delta water quality. Local agencies will continue to independently develop storage projects to meet local needs.

The Final Programmatic EIS/EIR identified 12 potential surface reservoir sites and many possible groundwater storage sites. Based upon the work of the Integrated Storage Investigation and previous studies, DWR and Reclamation will work with other CALFED Agencies to take the necessary steps to pursue expansion of two existing reservoirs and construction of a new offstream reservoir, with a combined capacity of 950 TAF and a major expansion of groundwater storage for an additional 500 TAF to 1 MAF. DWR and Reclamation will also study two potential storage projects through partnerships with local agencies. However, these two additional sites will require substantial technical work and further environmental review and development of cost-sharing agreements before decisions to pursue them as part of the CALFED Program.

Project	Potential Storage (acre-feet)
In-Delta Storage	250,000
Enlarged Shasta	300,000
Expanded Los Vaqueros	400,000
Groundwater/Conjunctive Use	500,000-1,000,000
TOTAL	1,450,000 - 1,950,000

The remaining potential reservoir sites in CALFED's screened list of 12 sites, as well as those sites previously screened out earlier during the site review process, appear to have less potential for providing benefits during Stage 1 or soon thereafter, either because of cost, extensive planning and analysis required, or other factors. Some of these sites may be retained solely for analysis purposes and could serve as alternatives to the above projects. Future progress and experience with implementation of other parts of the Program, such as the EWA or south Delta conveyance improvements, may better define potential benefits of these storage projects. CALFED does not plan to pursue implementation of any of these projects at this time.

The benefits of increased water supply reliability resulting from actions to provide expanded storage (as well as to provide conveyance improvements, described in section 2.2.6) will be available to be shared among beneficial uses as appropriate to the specific action. In evaluating and allocating costs and benefits of CALFED storage and conveyance projects, actions taken outside the CALFED Program will not provide entitlements or the justification for claims for any

parties or class of beneficial users to any particular allocation of storage and conveyance assets developed through the CALFED Program.

Surface Storage Projects To Be Pursued With Project-specific Study. The CALFED Final Programmatic EIS/EIR identified as a list of twelve potential surface storage projects for consideration. Further project-specific review, however, will be required. Actions taken in Stage 1 will focus on the necessary feasibility studies and environmental review for implementing or proceeding with three surface storage projects. In addition, two reservoirs will need further study before the CALFED Agencies or their successor decides whether to proceed with those projects.

C In-Delta storage project (approximately 250 TAF). An in-Delta storage facility can provide both fishery benefits and enhanced water project flexibility. CALFED will explore the lease or purchase of the Delta Wetlands project. CALFED also may initiate a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible.

S Make decision as to whether to seek authorization for a feasibility study of alternatives (Federal funds) by October 2000.

S Select project alternative and initiate negotiation with Delta Wetlands owners or other appropriate landowners for acquisition of necessary property by December 2001.

S Develop project plan that addresses local concerns about effects on neighboring lands and complete any additional needed environmental documentation by July 2002.

S Complete environmental review and documentation, obtain necessary authorization and funding, and begin construction by the end of 2002.

C Expand CVP storage in Shasta Lake by approximately 300 TAF. Such an expansion will increase the pool of cold water available to maintain lower Sacramento River temperatures needed by certain fish and provide other water management benefits, such as water supply reliability.

S Resolve legal issues to allow State agency cooperation by the end of 2000.

S Complete feasibility study and preliminary design by the end of 2003.

S Complete environmental review and documentation, obtain Federal authorization and funding, and begin construction by the end of 2004.

C Expand Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative. As part of a Bay Area initiative, an expanded Los Vaqueros Reservoir would provide water quality and water supply reliability benefits to Bay Area water users. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros Reservoir is subject to a number of mandates and agreements. DWR and

Reclamation will work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are respected.

- S Identify potential local partners and develop agreement with CCWD and other partners as needed for necessary studies by March 2001.
- S Secure authorization and funding for feasibility studies by July 2001.
- S Begin feasibility study and environmental review July 2001, complete feasibility study by July 2002.
- S Complete environmental review, documentation, and preliminary design on a selected alternative by the end of 2003.
- S Finalize agreements with project participants by mid-2004.
- S Obtain necessary authorizations and funding (including local voter approval) by the end of 2004, and begin construction by the end of 2005.

Surface Projects Requiring Further Consideration. In addition to the projects described above, CALFED will join local partners in Stage 1 to evaluate two additional surface storage projects. While these projects require extensive technical work, significant additional environmental review and development of cost-sharing agreements before a decision to implement the project as part of the CALFED Program.

C Sites Reservoir. This project, with a capacity of up to 1.9 million acre-feet, could enhance water management flexibility in the Sacramento Valley. By reducing water diversion on the Sacramento River during critical fish migration periods, this project can greatly increase reliability of supplies for a significant portion of the Sacramento Valley. It can also provide storage and operational benefits for other CALFED programs including Delta water quality and the EWA.

- S Develop joint planning program through an MOU with local water interests by October 2000.
- S Complete environmental review and planning documentation by August 2004.

C 250-700 TAF of additional storage in the upper San Joaquin River watershed. It would be designed to contribute to restoration of and improve water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. Additional storage could come from enlargement of Millerton Lake at Friant Dam or a functionally equivalent storage program in the region.

- S Begin comprehensive study of alternatives by the end of 2000.
- S Begin feasibility study on selected project by the middle of 2001.
- S Complete environmental review and planning documentation by the middle of 2006.

Groundwater Storage Projects. CALFED Agencies will facilitate and fund locally supported, managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF of additional storage capacity by 2007. Groundwater/conjunctive use projects will be implemented through locally supported and managed projects or through partnerships with local and regional interests. It is CALFED's intent to support voluntary, locally controlled groundwater projects which are designed to address local water needs first, before considering regional or statewide benefits. Groundwater quality will be an important criterion in the selection, operation and management of any of these locally controlled groundwater storage sites. These projects will include a combination of purchase, lease or sharing storage space with others, and will include consideration of existing groundwater storage facilities. CALFED has identified projects in the Sacramento Valley, near the Delta, the San Joaquin Valley and Southern California that could provide 500 TAF to 1 MAF of storage.

Stage 1 actions will include:

- Finalize agreements with new local project proponents for joint planning and development by February 2001.
- Begin feasibility studies by March 2001 with funding through CALFED and Proposition 13.
- Report on the performance of feasibility studies, implementable projects, and potential benefits and beneficiaries by the end of 2002. The report will separately identify likely local benefits as well as opportunities to benefit statewide water supply reliability and the EWA.
- Implement early stages of the most promising projects by the end of 2004. Aggressively pursue implementation of additional projects by the end of Stage 1.

Groundwater Management. Effective groundwater management programs are essential to the success of groundwater and conjunctive use projects, as well as to other CALFED programs such as water transfers and water quality. Currently, groundwater is managed in some areas of the State through adjudicated basins and by local water districts and agencies. While many of these districts and agencies have developed effective local groundwater programs, most groundwater basins in California are not managed to obtain the benefits that could be gained through conjunctive management of both groundwater and surface water. These benefits can include increased local water supply reliability, water quality protection, reduced subsidence, and mitigation of overdraft. CALFED believes that groundwater management at the sub-basin level will better protect groundwater resources while increasing local benefits that could be gained from conjunctive management. CALFED defines sub-basins as a portion of a groundwater basin delineated to reflect hydrologic or political boundaries. The sub-basin management system also would encourage local agencies to coordinate and integrate stakeholder-driven sub-basin management objectives while keeping intact the goals and elements of local plans. These objectives should include compliance with existing county ordinances and AB 3030 plans.

Therefore, CALFED Agencies will support legislation that encourages groundwater management at the sub-basin level.

AB 3030, which authorizes local agencies to enact voluntary groundwater management plans within their boundaries, is an important foundation for comprehensive groundwater management in California. AB 3030 also allows agencies to enter into agreements to develop basin-wide plans but does not require such basin-wide plans to be developed. DWR will adopt regulations for expenditure of grant and loan funds that make funding contingent upon local agencies having an AB 3030 plan or a functional equivalent in place. CALFED will work with local governments and affected stakeholders to develop legislation to strengthen AB 3030 and provide technical and financial incentives to encourage more effective basin-wide groundwater management plans, in part by conditioning future State funding for water programs on the development of local groundwater management plans by 2004.

Funding

The financing strategy for individual storage projects will vary due to the design and planned operations of each project. Final cost allocations, however, will be made based on the principle of “beneficiaries pay.” Generally, the planning and feasibility stages of surface storage projects will be pursued with State and Federal public funding. If a project is determined to be feasible, a cost allocation plan will be prepared as part of the design phase, preliminary cost allocations secured before construction begins, and final cost allocation agreements implemented prior to project completion. The expected total investments in storage during Stage 1 will be approximately \$1.4 billion.

Regulatory Compliance

All of the projects described above, as well as many other CALFED program actions, will need to comply with applicable regulatory programs. Potential surface storage projects being evaluated by CALFED will need to comply with, among other things, the requirements of the State and Federal ESA, the Clean Water Act Section 401 certification process, and the USACE regulatory permit program. CALFED has taken a number of steps to assure that the regulatory review process for storage projects proceeds in a timely manner. These steps are discussed in more detail in Section 3.

2.2.6 Conveyance

As indicated in the Preferred Program Alternative, the CALFED Agencies have chosen to pursue a through-Delta conveyance strategy. The CALFED Agencies therefore will take all reasonable actions to optimize the use of the Delta as the means for conveyance of State and Federal project export water.

The CALFED goal for Delta conveyance is to identify and implement conveyance modifications that will improve water supply reliability for in-Delta and export users, support continuous improvement in drinking water quality, and complement ecosystem restoration. More specifically for export and environmental purposes, conveyance improvements are needed to improve the pumping capabilities of SWP export facilities to: (1) restore water project reliability and operational flexibility; (2) allow the EWA to transfer and store water; (3) allow a reliable water transfer market to function; (4) allow SWP facilities to convey larger amounts of water during periods of high quality water in the Delta to improve water quality for urban use; and (5) provide greater capability for SWP facilities to be used to improve the reliability of CVP supplies for both its water users and wildlife refuges. DWR, Reclamation and USACE will lead efforts to implement these conveyance projects.

DWR and Reclamation will work with the other CALFED Agencies to pursue significant improvements in the water conveyance facilities in the Delta in Stage 1, which will be pursued through project-specific environmental review and permitting.

Actions Included in the Programmatic EIS/EIR

The following projects and actions were analyzed on a programmatic basis in the Final Programmatic EIS/EIR. As CALFED Agencies pursue project-specific environmental study, additional project-specific mitigation may be necessary.

South Delta. The specific actions listed below are components of, or are directly related to, the “South Delta Improvement Program” which has been under study and development for a number of years. The CALFED Agencies intend for these actions in the South Delta to address the needs of the export projects, the Delta ecosystem and local, in-Delta agricultural water users. These components will go forward following the completion of project-specific environmental review and permitting. DWR will lead the CALFED Agencies in implementing these south Delta actions. Environmental review will be completed by the end of 2002. These actions, related to providing for more reliable long-term export capability by the SWP and CVP and protection of local diversions in the Delta, are in addition to historic and current efforts (including annual installation of temporary barriers as well as current year local dredging and diversion improvements).

C Increase SWP pumping from the current limit from March 15 to December 15 to 8,500 cfs; and modify existing pumping criteria from December 15 to March 15 to allow greater use of SWP export capacity. Increased pumping can be used to increase water supplies through restoring the SWP's operational flexibility as well as allow diversion of a larger proportion of water supplies in the Delta during periods of good water quality. SWP facilities are used first for SWP purposes, as provided for in SWP water supply contracts. Increased pumping capabilities will also increase opportunities to convey water for the CVP, the EWA and water transfers, since the availability of pumping capacity for non-SWP purposes is expected to increase under this action. Such increased pumping is conditional upon avoiding adverse impacts to fishery protection and in-Delta water supply reliability.

S Complete environmental review by the end of 2002.

S Secure appropriate regulatory permits by the middle of 2003 to increase pumping up to 8,500 cfs during periods that are currently restricted. This includes completing a project-specific operations plan that addresses the potential impacts of increased pumping. The operations plan will be developed through an open CALFED process. This pumping increase will increase export capability by up to 100,000 acre-feet per month depending on hydrological conditions, fisheries conditions and availability of storage south of the Delta.

S Full use of this increased pumping capability will require continued implementation of temporary barriers on an annual basis as well as project-specific actions to protect agricultural diversions and navigation in the South Delta.

C Increase SWP pumping to the maximum capability of 10,300 cfs. This is to be accomplished through two sets of specific actions set forth below. As the South Delta Improvement Program is fully implemented through the end of Stage 1, the SWP export capability will increase to 10,300 cfs, greatly expanding benefits for all purposes. Full use of this capacity will depend on protection of agricultural diversions and navigation in the South Delta, hydrologic conditions, fisheries conditions, availability of storage south of the Delta, and use for non-SWP purposes.

S Design and construct new fish screens at the Clifton Court Forebay and Tracy pumping plant facilities to allow the export facilities to pump at full capacity more regularly.

< Complete funding plan by early 2003.

< Complete facilities design by the middle of 2004.

< Seek funding and authority to complete initial fish screens, and begin operations and performance testing by the middle of 2006.

S Dredge and install operable barriers to ensure water of adequate quantity and quality to agricultural diverters within the South Delta. This will include installation of an operable Grant Line Canal barrier, which will be constructed and operated in accordance with conditions and directions specified by USFWS, DFG and NMFS. In the interim prior to installation of permanent operable barriers, DWR would continue to install temporary barriers on an annual basis.

- < Complete funding plan by early 2003.
- < Complete facilities design by the middle of 2005.
- < Seek funding and authority to complete Head of Old River barrier by the end of 2006.
- < Seek funding and authority to complete Middle River barrier, Tracy barrier and Grant Line Canal barrier by the end of 2007.

C Design and construct floodway improvements on the lower San Joaquin River to provide conveyance, flood control and ecosystem benefits. USACE and DWR will work with the other CALFED Agencies to assure that the Comprehensive Study is consistent with this project.

- S** Complete environmental studies by early 2003.
- S** Complete project design and funding plan by early 2004.
- S** Begin construction by the middle of 2005.

C Reduce agricultural drainage in the Delta. Actions to reduce such drainage will include early implementation of projects on Veale and Byron tracts to reduce or relocate major sources of drainage into South Delta channels. The purpose of these projects is to minimize elevated salinity and other constituents of concern to drinking water at urban intakes in the South Delta. These projects will be completed prior to completion of the installation of permanent barriers in Old River near the San Joaquin River, Grant Line Canal, Old River near Tracy and Middle River and before SWP pumping can increase to its full capacity of 10,300 cfs during periods that are currently restricted.

North Delta. CALFED will improve flood protection and conveyance facilities in the North Delta for water quality and fishery improvements, and avoid water supply disruptions. The improvements include:

C Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns. Reclamation will lead this effort, in cooperation with the other CALFED Agencies, particularly the fishery agencies.

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- S Begin operational studies (such as more intense fish monitoring on both sides of the Cross Channel, opening and closing the gates on tidal cycles, etc.) by October 2000.
 - S Complete studies and make specific recommendations by the end of 2003.

C Simultaneously evaluate a screened through-Delta facility on the Sacramento River of up to 4,000 cfs. The diversion facility on the Sacramento River is an action to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The lead agencies for this effort are DWR and Reclamation, in cooperation with the other CALFED Agencies. The historic emphasis has been on a screened diversion at Hood on the Sacramento River. This and other potential sites between and including Hood and Georgiana Slough will be considered as part of this evaluation. (The water quality section below discusses other related water quality actions and how this facility could fit into the broader water quality strategy.)

- S Develop specific study plan by October 2000.
- S Fund and begin studies through CALFED Agency appropriations by October 2000.
- S Complete water quality and fish effects studies and develop recommendations, taking into consideration the results of the Delta Cross Channel operational study above and evaluation of water quality measures, by the end of 2003.
- S Complete environmental review of recommended program. If fish protection conditions are met and facility is found to be necessary, seek funding and authority to begin construction by the end of 2007.

C Design and construct floodway improvements in the North Delta (such as on the lower Mokelumne River and Georgiana Slough) to provide conveyance, flood control and ecosystem benefits. The CALFED Agencies intend that final development and implementation of actions under the Comprehensive Study will be coordinated and consistent with the CALFED Bay-Delta Program.

- S Complete environmental studies by early 2003.
- S Complete project design and funding plan by early 2004.
- S Make decision whether to seek funding and authority to begin construction by the middle of 2005.

Interties. The CALFED Agencies will pursue a number of interties and bypasses in the water system.

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- C** **An intertie between the SWP and CVP facilities at or near Tracy.** This short channel between the State and Federal canals would allow operators to take advantage of fluctuations in Delta water quality at the two project intakes, delivering higher quality to either project canal.
 - S** Complete environmental work and project design by the middle of 2004.
 - S** Complete funding plan by the middle of 2004.
 - S** Make decision whether to seek funding and authority to begin construction by the end of 2004.
 - S** Assess the connection of the CVP to the SWP's Clifton Court Forebay with a corresponding increase in the Forebay's screened intake.

Complementary Actions

The Framework identified the following actions, which were not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review:

- C** **Install and operate temporary barriers in the south Delta until fully operable barriers are constructed as the South Delta Improvements Program is implemented.** The purpose of this program is to increase water levels in the south Delta for agricultural irrigators in the area to ensure they have an adequate water supply for diversion until such time as a permanent south Delta solution is provided through implementation of other conveyance facilities identified in the South Delta Improvements Program. The Temporary Barriers Program (TBP) has been in place through 1991-2000. One of the barriers in the TBP is the spring Head of Old River barrier which is a critical component of the Vernalis Adaptive Management Plan, an action which the CALFED Agencies have identified for immediate implementation. The TBP is an annual activity requiring the preparation of environmental documentation, securing required regulatory and access permits, interagency coordination, monitoring, modeling, installation, operation and removal. This is ongoing, beginning in FY 2000-2001.

- C** **Take actions to protect navigation and protect local diverters in the south Delta who are not adequately protected by the TBP.** Although the south Delta barriers provide adequate protection to much of the south Delta, there are still some diverters who suffer from low water levels because they are downstream or located too far away from the barriers. Actions which need to be taken to protect these diverters may include: installation and operation of portable pumps, limited project-specific dredging of existing intakes, and/or project-specific modification to existing diversion structures including the conversion of siphons to pumps. This action requires preparing detailed plans at each diversion location, preparing permit applications, preparation of environmental documentation (as needed), securing applicable permits and funding and finalizing agreements with the diverter as to the scope of work to be done and funding of the work.

This work is ongoing, as needed, beginning in FY 2000-2001.

C A bypass canal to the San Felipe Unit at the San Luis Reservoir. When operated in conjunction with local storage, this canal would allow Santa Clara Valley Water District to receive water directly from the Delta pumping facilities, thereby avoiding water quality problems associated with the “low point” water levels in San Luis Reservoir. Resolving this “low point” issue also will increase the effective storage capacity in San Luis Reservoir up to 200 TAF.

S Fund studies of bypass canal and related expansion of local storage through Proposition 13, allocate funds to Santa Clara Valley Water District, the implementing agency, by October 2000.

S Complete environmental review and documentation and preliminary design by the end of 2003.

S Obtain necessary authorization and funding and begin construction by end of 2004.

C Facilitate water quality exchanges and similar programs to make high quality Sierra Nevada water in the eastern San Joaquin Valley available to urban Southern California interests. The Metropolitan Water District of Southern California and the Friant Water Users Authority and its member agencies have commenced preliminary discussions to accomplish these objectives, as well as improving water supply reliability for the agricultural districts. DWR and Reclamation will work with the other CALFED Agencies and these two non-CALFED Agencies to assure that these efforts do not adversely affect ongoing consensus efforts to restore the upper San Joaquin River.

S Initiate evaluations and studies of potential infrastructure improvements by December 2000.

S Complete feasibility studies and implement selected demonstration projects by the end of 2001.

S Complete environmental review and begin implementation of a long-term program, including necessary infrastructure, by the end of 2004.

C Sacramento and San Joaquin Comprehensive Study. USACE and the Reclamation Board are currently implementing a Comprehensive Study of the Sacramento and San Joaquin River watersheds to improve flood control efforts out to San Francisco Bay. The Delta and its ability to convey flood waters play a crucial role in the Comprehensive Study. The CALFED Agencies intend that final development and implementation of actions under the Comprehensive Study will be coordinated and consistent with the CALFED Bay-Delta Program.

Funding

CALFED anticipates that the cost of implementing the conveyance program improvements in Stage 1 will be approximately \$1 billion.

2.2.7 Environmental Water Account

An essential goal of the CALFED Program is to provide increased water supply reliability to water users while at the same time assuring the availability of sufficient water to meet fishery protection and restoration\recovery needs as part of the overall ERP. As a means to achieving this, the CALFED Agencies will provide commitments under FESA and CESA for the first four years of Stage 1, which will be based on the availability of water from existing regulation, an EWA combined with the ERP, and the ability to obtain additional assets should they be necessary.

The EWA focuses on resolving the fishery/water diversion conflict at the CVP/SWP Delta export pumps because, in recent years, these diversions have suffered the greatest fluctuations in water supply reliability due to conflicts with fishery needs. The CALFED Agencies will continue working with other diverters in the Delta watershed to resolve local fishery-diversion conflicts based on the project-specific needs and opportunities for each diversion. The CALFED Agencies have crafted the EWA so that it has no effect on the water rights of other water right holders in the watershed.

Overall Purpose, Framework and Administration

The EWA has been established to provide water for the protection and recovery of fish beyond water available through existing regulatory actions related to project operations. The EWA is a cooperative management program whose purpose is to provide protection to the fish of the Bay-Delta estuary through environmentally beneficial changes in SWP/CVP operations at no uncompensated water cost to the projects' water users. This approach to fish protection requires the acquisition of alternative sources of project water supply, called the "EWA assets," which will be used to augment streamflows, Delta outflows, to modify exports to provide fishery benefits and to replace the regular project water supply interrupted by the changes to project operations. The replacement water will compensate for reductions in deliveries relative to existing facilities, project operations and the regulatory baseline (as defined below) that result from EWA actions.

USFWS, NMFS, DFG, Reclamation and DWR have established the EWA by executing the Environmental Water Account Operating Principles Agreement contemporaneously with this ROD. This summary should be interpreted to be consistent with the EWA Operating Principles Agreement. To the extent that the EWA Operating Principles Agreement provides greater specificity than or may be inconsistent with this summary, the EWA Operating Principles Agreement controls.

The EWA will provide additional protection for fish and provide support for a commitment not to reduce south of Delta project deliveries. The CALFED Agencies intend to use EWA assets for, among other things, extending pumping curtailments during critical periods for fish. As currently designed, the EWA would not be used to supply water to meet any new regulatory requirements under statutes other than FESA and CESA (such as new Federal Energy Regulatory Commission (FERC) or SWRCB instream flow requirements).

The EWA will be funded jointly by the State and Federal governments and will be authorized to acquire, bank, transfer, sell and borrow water and arrange for its conveyance. EWA assets will be managed by the State and Federal fishery agencies (USFWS, NMFS, and DFG) in coordination with project operators and stakeholders, through the CALFED Operations Group. Initial acquisition of assets for the EWA will be made by Reclamation and DWR. Subsequently, it is anticipated that acquisitions will be made pursuant to a public process that may capitalize upon the ability of other agencies or third parties to acquire assets.

Baseline Level of Protection. The EWA will provide for fishery protection actions that are supplemental to a baseline level of protection established by an existing set of regulatory programs. The baseline level of protection, identified as Tier 1 in the EWA discussion below, consists of:

- **1993 Winter-run Biological Opinion (NMFS)**
- **1995 Delta Water Quality Control Plan (SWRCB).** At this time, SWP and CVP are responsible for meeting flow related objectives contained in this plan. The CALFED Agencies recognize that the SWRCB may adjust or reallocate the responsibilities for meeting the 1995 Delta Water Quality Control Plan standards, as part of its ongoing Bay-Delta Water Rights Hearing. Adjustment of responsibility to meet the standards will not affect the baseline level of protection for purposes of the EWA.

Appropriate CALFED Agencies will develop a strategy to deal with the rare circumstances when the CVP obligation under the Water Quality Control Plan exceeds the 450 TAF annual cap for use of CVPIA Section 3406(b)(2) water. In the strategy, to be developed in conjunction with the Governor's Drought Contingency Plan, the Agencies will use their available resources to create an insurance policy that will seek to eliminate impacts to water users, while not adversely affecting other uses.

- C **1995 Delta Smelt Biological Opinion (USFWS).** The export curtailment contained in the 1995 Delta Smelt Biological Opinion (item 2 on page 19), commonly referred to as the "2 to 1 Vernalis flow/export ratio", will be met by Section 3406(b)(2) of the CVPIA and/or EWA. This objective calls for the SWP and CVP to reduce combined exports, below what is allowed in the 1995 Water Quality Control Plan during a 31-day period in April and May. The 1995 WQCP

allows exports to be 100 percent of the base San Joaquin River flow at Vernalis during the April-May pulse period. The SWP will be reimbursed by the EWA for its participation in reducing exports pursuant to the 2 to 1 Vernalis flow/export ratio.

The CVP and SWP will be operated pursuant to the terms of the San Joaquin River Agreement (SJRA) through 2011. While the SJRA is in effect, the exports may be reduced beyond what is called for by the 2 to 1 Vernalis flow/export ratio and San Joaquin River flows may be augmented by water acquired from upstream sources during that same time period. Such an augmentation will not be included as part of the SWP share of Vernalis flow. While operating pursuant to the SJRA, the SWP and CVP will also receive reimbursement from the EWA or pursuant to Section 3406(b)(2) for the additional curtailment. If the SJRA is not implemented for any reason, the operations will default back to the biological opinion operation, pursuant to the terms of the SJRA.

- **Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in accordance with Interior’s October 5, 1999 Decision, clarified as follows:** *Water Resulting from Refill of Reservoirs (“Reset”):* Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases (“reset”) will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the “reset” provision.

Export Curtailments which Result in Increased Storage (“Offset”): Where a prescribed (b)(2) export curtailment results in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to south-of-Delta CVP contractors in the remainder of the water year. If such deliveries cannot be increased in that water year, such additional water stored in upstream reservoirs shall be available for other (b)(2) uses without charge to the (b)(2) account. Where the delivery to export users in the remainder of the water year will not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

Other Environmental Protections. The regulatory baseline above also assumes that other environmental protections contained in statutes remain in place. These other environmental protections include without limitation Level 2 refuge water supplies, as required by the CVPIA. The CVP will use its share of the benefits from Joint Point of Diversion, to the extent available, to provide water required by its Level 2 refuge water supply mandates, but using such benefits will not create any limitation on the Level 2 supply available for refuges.

Asset Development. Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in the table below, an initial one-time deposit of water equivalent to 200 TAF of south-of-Delta storage will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries.

Borrowing agreements will allow the EWA to borrow water from the Projects for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be equitably shared. The limitations on borrowing are described in the EWA Operating Principles Agreement attached to this document.

Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries and operations will not be affected by EWA operations. As CALFED develops new water, the EWA will obtain an appropriate share in order to minimize the need for annual acquisitions and to maximize operational flexibility.

ESA Commitments

As part of the MSCS Conservation Agreement and the FWS and NMFS biological opinions, the CALFED Agencies have provided a commitment, subject to specified conditions and legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP Delta exports resulting from measures to protect fish under FESA and CESA. This commitment is based on the availability of three tiers of assets:

Tier 1 is baseline water, provided by existing regulation and operational flexibility as described above. The regulatory baseline consists of the biological opinions on winter-run salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP Yield pursuant to CVPIA Section 3406(b)(2).

Tier 2 consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish when needed without reducing deliveries to water users. These assets are shown in the table on the preceding page. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets as described below.

Action Description	Water Available Annually (Average)
SWP Pumping of (b)(2)/ERP Upstream Releases ¹	40,000 acre-feet ²
EWA Use of Joint Point³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta⁴	35,000 acre-feet
TOTAL	380,000 acre-feet

Tier 3 is based upon the commitment and ability of the CALFED Agencies to make additional water available should it be needed. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, the third tier will be provided. In considering the need for Tier 3 assets, the fishery agencies will consider the views of an independent science panel. Although the CALFED Agencies do not anticipate needing access to Tier 3 of water assets, the CALFED Agencies will prepare an implementation strategy for Tier 3 by August 2001, establishing a timely scientific panel process and identifying tools and funding should implementation of Tier 3 prove necessary.

Implementation of the EWA and associated ESA commitments is not intended to affect the rights or obligations of third parties.

¹ The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

² The amount of water derived from the first four actions will vary based on hydrologic conditions.

³ The EWA will share access to Joint Point of Diversion, with the CVP receiving 50% of the benefits.

⁴ This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

2.2.8 Water Use Efficiency

The goal of the Water Use Efficiency Program is to accelerate the implementation of cost-effective actions to conserve and recycle water throughout the State. Water use efficiency measures are included in the CALFED Program for many reasons, including (a) water use efficiency investments can yield real water supply benefits to urban and agricultural users in the short term, especially compared to surface storage and major conveyance improvements that will take at least 5 to 10 years to complete; and (b) water use efficiency investments can generate significant benefits in water quality and timing of instream flows, even where they may not generate a net increase in available consumptively used water. Water reclamation provides additional opportunities to reduce water demand in a relatively cost-effective and environmentally-benign manner, with multiple benefits for efficiency, dry year reliability and discharge water quality. CALFED Agencies anticipate that significant investments in water use efficiency and water reclamation will be necessary during Stage 1 and beyond to address water supply demands caused by a rapidly increasing population and increased environmental water needs. These savings will be accomplished through incentive-based water use efficiency programs.

Water use efficiency potential varies significantly in California, depending on the region of the State and the sector involved. Working with the stakeholder steering committees and other technical experts, CALFED Agencies have developed ranges of estimated water savings during Stage 1. These estimates include only water that is currently unavailable for other uses because it is lost to excessive evaporation or drains to the ocean or some other unusable destination. In addition, approximately 225 to 310 TAF of water can be made available through water reclamation projects. These water savings would be generated as follows:

- 520 to 688 TAF in the urban sector
- 260 to 350 TAF in the agricultural sector
- 225 to 310 TAF in water reclamation projects

These estimates are not intended as targets, and focusing on potential water savings alone ignores the substantial contribution that water use efficiency investments can make to other CALFED program goals. Water savings estimates for urban uses are greater because water conservation savings are more cost-effective (given the higher cost of most urban supplies). Agricultural conservation opportunities exist but are more limited by financial capability and by the fact that a higher percentage of agricultural return flows are used by downstream users and are therefore not included in conservation estimates.

Incentive-Based Program

The primary CALFED program tool for encouraging investments in water use efficiency will be a competitive grant/loan program. This program, under the leadership of DWR, Reclamation, the SWRCB and NRCS, will identify and provide grants or cooperative agreements (with local cost share) or loans to the most promising water use efficiency projects, including:

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- C Urban water use efficiency measures.
 - C Agricultural water use efficiency measures.
 - C Water reclamation/recycling projects.

CALFED Agencies will rely on a competitive grant/loan program as the best mechanism to assure cost-effective investments in water use efficiency. Under this program, CALFED Agency investments will be made in the most cost-effective water use efficiency measures first. Due to the regional differences in water use efficiency potential, the exact cost-effective measures will vary. For example, in some agricultural districts the cheapest improvements may be to install automated delivery systems, while other districts may find channel improvements or canal lining productive. Similarly, differences exist statewide in the urban sector. Some agencies may focus on low-flow device retrofits, while others may have substantial opportunities for using reclaimed water. CALFED Agencies anticipate that the competitive grant/loan program would allow participating entities to effectively respond to local conditions.

Each grant/loan package will include tailored requirements for performance and accountability. The program would be used primarily as a capitalization mechanism; the ongoing obligations for operation and maintenance would be assumed by the participating agency. By using a competitive grant/loan program approach, water users and the program can respond to changes in the water supply picture over time. As water demands increase in the State as anticipated, and the most cost effective water use efficiency measures have been implemented, water users and the grant/loan program would increasingly turn to the more expensive water use efficiency measures.

Two elements will be critical to the success of a CALFED grant/loan program:

- C Water agencies must implement water use efficiency measures that are cost-effective and appropriate at the local level. This level of attainment will be defined by agency compliance with the AB 3616 Agricultural Water Management Plans (for agricultural districts) or implementation of applicable Urban Water Conservation Council “best management practices” (for urban districts). CALFED Agencies anticipate that State and Federal assistance to agencies to attain this base level of water use efficiency will generally be in the form of technical assistance and capitalization loans, not grants. In addition, access to further CALFED Water Use Efficiency Program benefits (e.g., grants) will be conditioned on agency implementation of the applicable water management plans.
- C Additional CALFED investments in water use efficiency are premised on the fact that some water use efficiency measures may not be cost-efficient when viewed solely from a local perspective, but may be cost-effective when viewed from a statewide perspective, compared to other water supply reliability options. In this case, CALFED Agencies anticipate a larger State and Federal assistance share in the form of grants. CALFED Agencies’ proposed grant/loan program will tailor specific grants or loans to reflect this distinction between local benefits and statewide benefits, and will adjust the required local cost-share requirements accordingly.

The CALFED Agencies will support water use efficiency actions that also provide economic and other benefits to disadvantaged communities by ensuring they have a role in implementing such programs, both in the agricultural and urban sectors. Examples include not only toilet retrofit programs such as those undertaken by community-based organizations in Los Angeles, but also toxics reduction and pollution prevention programs that are linked to water use efficiency and wastewater reduction, and multilingual irrigator training programs.

Actions Included in the Programmatic EIS/EIR

Stage 1 actions of the Water Use Efficiency Program include:

- C CALFED Agencies will prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED governance structure, responsibilities for technical assistance programs and the grant/loan program, and evaluation procedures, by December 2000. In developing the grant/loan program, CALFED Agencies will consider the particular circumstances of the different program elements, as well as the ongoing stakeholder forums. These forums include the Agricultural Water Management Council, California Urban Water Conservation Council, the steering committees providing guidance to CALFED Agencies in the agricultural, urban and recycling programs, as well as the public advisory committee described below. The program implementation plan will include:
 - S Incentives in the agricultural sector that will consider several factors, including: (i) the potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUE measures; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the water needs of the recipient area can be satisfied from existing sources. Many of these factors are included in the quantifiable objectives being developed in the CALFED process by the agricultural water use efficiency steering committee stakeholder process, and CALFED Agencies anticipate that these quantifiable objectives will be an important factor in prioritizing expenditures under the agricultural incentive program.
 - S Incentives in the urban sector that will focus on implementing the urban MOU process and on identifying and implementing measures that are supplemental to BMPs and are cost effective from a statewide perspective.
 - S Incentives in the water reclamation area that will recognize the importance of regional water recycling programs, such as the Bay Area regional water recycling program and the Southern California comprehensive water reclamation and reuse study. CALFED Agencies will work with stakeholders to create cost-effectiveness criteria, building on approaches that have been previously developed for regional water recycling programs, that will guide the incentive program for water

reclamation.

- S** A recognition and plan for addressing the need to make financial allocations in the incentive programs in the early years of implementation, in advance of approvals and/or certifications by the applicable Urban or Agricultural sector councils.
- C** Within one year from the adoption of this ROD, CALFED Agencies will establish specific milestones, and associated benefits, remedies and/or consequences to track and guide the implementation of the Agricultural Water Use Efficiency Program. CALFED Agencies will put in place a process, structured to include the involvement and buy-in of interested parties (stakeholder and agency), to accomplish this work. The process will build on the work already begun by the Agricultural Water Use Efficiency Steering Committee.
- C** The CALFED Agencies will develop a detailed finance proposal for Stage 1, including an evaluation of local cost share potential, no later than July of 2001. Recognizing that funding for the Water Use Efficiency Program will necessarily come from many different State and Federal sources, CALFED Agencies will assure that the Water Use Efficiency Program has sufficient resources for vigorous programs in each of the agricultural, urban, and water reclamation sectors.
- C** DWR and Reclamation will work with the Urban Water Conservation Council and Agricultural Water Management Council to provide technical assistance to urban agencies and agricultural districts developing management plans under the Urban Water Management Planning Act and the AB 3616 process. This effort, when combined with efforts of NRCS and California Department of Food and Agriculture, will in the first four years of Stage 1 provide \$34 million in technical assistance to districts and agencies in meeting their Council-endorsed or certified management plans.
- C** The Department of the Interior will create a public advisory committee, as part of the new FACA committee, to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate Federal, State, regional and local efforts for maximum effectiveness. We anticipate that this advisory committee will include representatives of the agricultural, urban, and recycling steering committees, local agencies, and local farmworker organizations. The advisory committee will be established by December 2000.
- C** By the end of 2002, CALFED Agencies will implement a process for certification of water suppliers' compliance with the terms of the urban MOU, including implementation of best management practices for urban water conservation. CALFED Agencies will support ongoing efforts of the California Urban Water Conservation Council to address this issue.
- C** In addition to the annual evaluations of program progress, by December of 2004 CALFED Agencies will conduct a comprehensive evaluation of the Program's first 4 years, and will make appropriate additional State and Federal investments and actions to assure continued

aggressive implementation of water use efficiency measures in the State.

Water Measurement and Transfer Incentive Actions

Diverse stakeholder groups have recognized the importance of, and need for, appropriate measurement of water deliveries. Measurement will provide better information on statewide and regional water use, enable water purveyors to charge for water according to the amount used, allow water users to demonstrate the effects of efficiency measures, and facilitate a water transfers market. CALFED Agencies have initiated a public process to add greater definition to “appropriate measurement”:

- C An independent review panel on appropriate measurement will be convened. This panel will provide guidance that will help define appropriate measurement as it relates to surface and groundwater usage. The panel will prepare a consensus definition of appropriate measurement by the end of 2001.
- C At the completion of this stakeholder/technical process, CALFED Agencies will work with the California State Legislature to develop legislation for introduction and enactment in the 2003 legislative session requiring the appropriate measurement of all water uses in the State of California.

Complementary Actions

CALFED Agencies believe that in order to promote water use efficiency measures in the agricultural sector, end users need to be able to beneficially participate in an active water transfer market. CALFED Agencies recognize that one barrier to an effective water transfer market is the lack of incentive for individual landowners to utilize available water conservation technologies because any water savings frequently accrue not to the landowner but to the irrigation district or water supply agency. CALFED Agencies will develop and support proposals to remove this disincentive to voluntary implementation of water use efficiency improvements.

Funding

CALFED Agencies have worked with the stakeholder steering committees, technical experts and practitioners to develop cost estimates associated with water use efficiency measures and water reclamation. Based on this outreach effort and evaluation, CALFED Agencies have estimated that achieving the potential water savings above would require an investment by the State and Federal governments in the range of \$1.5 to \$2 billion over the seven years of Stage 1. These funds, which will be allocated to local entities in the form of grants and/or loans for water use efficiency projects, will be matched with local or private funds on a project-by-project basis. During the first four years of Stage 1, CALFED Agencies propose State and Federal government investment

of \$500 million, with an additional \$500 million coming from local matching funds. This cost share provides an overall Stage 1 allocation, but individual project cost-shares may vary depending on the detailed finance proposal being developed and the nature of the projects developed by local agencies.

A water use efficiency program of this magnitude is aggressive and unprecedented nationally. CALFED Agencies strongly endorse this aggressive program as part of a broad CALFED Program designed to address California's water supply needs for the future. At the same time, given the uncertainties of implementing such an ambitious program, CALFED Agencies believe it will be appropriate to carefully evaluate the ongoing progress of the Program as it gets off the ground. CALFED Agencies will require annual reports from implementing agencies describing the progress of implementation efforts. These reports should include an ongoing evaluation of the availability of local cost-share financing and program effectiveness, and should include recommendations on removing any impediments to aggressive program implementation. CALFED Agencies anticipate that these annual reports will serve as a guide to subsequent year investments and program refinements. In addition, at the end of the first four years of Stage 1, CALFED Agencies will prepare a more comprehensive evaluation of program implementation. At that time, it may increase or reduce the targeted conservation goals to reflect actual implementation experience, redirect investments within the Water Use Efficiency Program to achieve the most effective results, and/or introduce new programs as necessary and appropriate.

The Stage 1 investments reflect the fact that many of the water use efficiency measures can be brought on line in a relatively short time frame, so that both planning and construction/capital costs are included earlier in Stage 1. Comparing water use efficiency investments on an "annual cost basis" (that is, taking the capital costs and operating costs and amortizing them over the expected life of the project) is a common way to evaluate the cost-effectiveness of water management investments. For example, costs of most of the water use efficiency measures evaluated by CALFED Agencies in the urban sector range from \$150 to \$450 per acre-foot per year. Under the competitive grant/loan program, the cheaper measures would be employed first.

Initial State and Federal funding for Stage 1 water use efficiency programs outlined in this section are identified within Proposition 204, Proposition 13, the CVPIA, the Reclamation Reform Act, Title XVI of P.L. 102-575, and various accounts in the Federal Farm Bill and related NRCS appropriations. Funding for the completion of the Water Use Efficiency Program will be determined through the Legislative and Congressional budget processes. The CALFED governing body will determine additional funding needs by the middle of 2004, which will be based upon the results of the program review and stakeholder input. Future funding, if necessary, may be sought through a bond measure that may also fund other out-year costs of the CALFED Program.

2.2.9 Water Quality

CALFED's Water Quality Program goal is to provide good water quality for the millions of Californians who rely on the Delta for all or a part of their drinking water. Current drinking water quality problems vary significantly by water agencies, depending on the agency's particular water sources. For example, the Metropolitan Water District of Southern California (MWD) and other Southern California utilities obtain water from the Delta via the State Water Project. MWD also receives highly saline Colorado River water which is then blended with Delta water. High levels of salinity are a major water quality problem for MWD, as are elevated levels of bromide and organic carbon. Salinity makes water taste bad and inhibits effective water recycling programs. Bromides and organic carbon interact with disinfection agents used in water treatment to create hazardous "disinfection byproducts" with potential adverse health effects.

In comparison, the Santa Clara Valley Water District, which is connected to both the Federal project (at San Luis Reservoir) and the State Water Project (via the South Bay Aqueduct from Clifton Court) shares the MWD concerns about salinity in Delta water, but may be even more sensitive to algal problems caused by low water levels in the San Luis Reservoir. The Contra Costa Water District takes its water directly from the Delta, and is highly sensitive to variations in Delta water quality. The North Bay Aqueduct of the SWP suffers from water quality problems during winter runoff periods. East Bay Municipal Utility District (EBMUD) and San Francisco get most of their water from the Sierra Nevada mountains, so they are less affected by Delta water quality. These differing situations for different water agencies require multifaceted approaches to drinking water quality that involve combinations of source water improvement, innovative and collaborative water management, and treatment options.

CALFED Agencies have adopted a general target of continuously improving Delta water quality for all uses, including in-Delta environmental and agricultural uses. Program actions designed to improve water quality to protect environmental uses are generally included in the Ecosystem Restoration Program (ERP) discussed above. For the drinking water quality program, CALFED Agencies have developed a specific goal based upon extensive stakeholder and agency involvement. CALFED Agencies' target for providing safe, reliable, and affordable drinking water in a cost-effective way, is to achieve either: (a) average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon, or (b) an equivalent level of public health protection using a cost-effective combination of alternative source waters, source control and treatment technologies.

CALFED Agencies will aggressively pursue a mix of strategies in order to improve in-Delta water quality. Program actions to address the drinking water quality concerns of the more than 22 million Californians who rely on Delta water fall into four broad categories. These actions will:

- Enable users to capture higher quality Delta water for drinking water purposes.
- Reduce contaminants and salinity that impair Delta water quality.
- Evaluate alternative approaches to drinking water treatment to address growing concerns over disinfection byproducts and salinity.

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- Enable voluntary exchanges or purchases of high quality source waters for drinking water uses.

None of these actions, by itself, can assure adequate supplies of good quality drinking water for California. They must all be pursued, in conjunction with other CALFED actions such as conveyance and storage improvements, to generate significant improvements in drinking water at the tap. The responsibility for drinking water protection in the Bay-Delta ecosystem is shared by the State Department of Health Services (DHS), CalEPA (including the State Water Resources Control Board and the CVRWQCB) and DWR, with EPA providing funding and technical assistance. In particular, the CVRWQCB, with support from the CALFED agencies and DHS, is currently developing a comprehensive drinking water policy for Delta and upstream tributaries. The CALFED agencies will continue to coordinate drinking water protection efforts, with particular attention to ensuring fair treatment for communities of color and of lower socio-economic status by engaging and supporting local communities and stakeholders who are actively seeking to address water quality issues through pollution prevention, monitoring, and education activities.

The CALFED Agencies will seek to maintain the quality of existing and potential sources of drinking water supply, both groundwater and surface water. Specifically, before any locally controlled groundwater storage facilities are slated for storage of water supplies for local drinking water use, the CALFED Agencies will work with those communities to identify the sites with the lowest possible level of contaminants of concern and to identify the best quality sources economically available.

In response to recent conflicts between Delta water quality, water supply and fishery protection measures, in February 2000, CALFED Agencies developed and implemented an operations management coordination process. As described in the governance section, CALFED Agencies will continue to apply that process to Delta operations. CALFED Agencies believe this process, using the Operations Group and Water Operations Management Team, will assure concurrent consideration of water quality, fisheries and water supply in water project operations.

Actions Included in the Programmatic EIS/EIR

The CALFED Agencies will implement the following major elements of the Water Quality Program:

- C Address drainage problems in the San Joaquin Valley to improve downstream water quality.** This will include implementing recommendations from the San Joaquin Valley Drainage Program, identifying and supporting innovative drainage management programs, and supporting voluntary land retirement programs for drainage impaired lands, with local sponsorship. This includes CALFED actions, which target approximately 35,000 acres of land retirement, as well as complementary land retirement actions under other programs such as CVPIA. Actions include:

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- S Finalize State Basin Plan Amendment and Total Maximum Daily Load for salinity in the lower San Joaquin River by the end of 2001.
 - S Begin implementation of appropriate source control measures (e.g., on farm and district actions, development of treatment technology, real-time management and reuse projects such as agroforestry) by the end of 2003.

Reclamation is responsible for providing drainage service as required by the San Luis Act for its San Luis Unit contractors on the westside of the San Joaquin Valley and will be considering a range of options for continued work to resolve the drainage issues in that area.

- C Implement source controls in the Delta and its tributaries.** The CALFED Agencies with the assistance of the Department of Health Services will coordinate a comprehensive source water protection program. This program will include identification and implementation of appropriate pollutant source control measures, focused regulatory and/or incentive programs targeting pollutants of concern, development of a monitoring and assessment program, and infrastructure improvements to separate drinking water intakes from irremediable sources of pollutants.

- S CVRWQCB, with support from the CALFED Agencies and DHS, will establish a comprehensive State drinking water policy for Delta and upstream tributaries by the end of 2004.
- S As part of the CALFED Science Program, develop a comprehensive monitoring and assessment program by the beginning of 2003.
- S Evaluate and determine whether additional protective measures (regulatory and/or incentive-based) are necessary to protect beneficial uses by the end of 2004.
- S Consistent with the above policy, CVRWQCB, with support from DWR and DHS, will begin implementation of appropriate source control measures (e.g., advanced wastewater treatment, local drainage management practices) by the end of 2006.

- C Support the ongoing efforts of the Delta Drinking Water Council or its successor** to develop recommendations to the CALFED Agencies on treatment, alternative water sources, conveyance improvements, storage and operations necessary to meet CALFED's goal of continuous improvement in Delta water quality for all uses. The Council will rely in part on the results of a nationwide multi-year, \$200 million, multi-stakeholder evaluation program led by the EPA to determine future standards and cost-effective treatment technologies, as well as the findings of the Independent Science Board and science panels. The Council will advise the CALFED Agencies on the composition of science panels related to drinking water. Actions include:

- S Council will complete initial assessment of progress toward meeting CALFED water quality targets and alternative treatment technologies by the end of 2003.
- S Council will complete final assessment and submit final recommendations on

progress toward meeting CALFED water quality targets and alternative treatment technologies by the end of 2007.

C Invest in Treatment Technology Demonstration. Recent private sector efforts have generated substantial advances in treatment technologies. The CALFED Agencies will encourage these technologies by funding a demonstration project to design and operate an ultra-violet disinfection plant, as well as other demonstration projects to design and operate desalination facilities for agricultural drainage using membrane treatment technology and focusing on management of brines and on-site waste stream management. Other promising treatment technologies that arise during the Program may be funded as well.

S Initiate UV disinfection plant demonstration project by the end of 2002.

S Initiate regional desalination demonstration project by the end of 2002.

S Evaluate practicability of and determine timelines for full-scale implementation by the beginning of 2007.

C Control runoff into the California Aqueduct and other similar conveyances. Much of the land surrounding the southern portions of the California Aqueduct is used for agriculture and grazing. A number of agricultural drains directly impact the Aqueduct, and large stretches of the Aqueduct are not adequately protected from stormwater runoff that is impaired by soil erosion or agricultural and livestock runoff. Other major drinking water conveyance channels have similar runoff problems. The CALFED Agencies will implement appropriate physical modifications and watershed programs to correct these problems.

S Initiate comprehensive evaluation of necessary physical modifications (e.g., modifications to berms, bypasses, and stormdrains to divert stormwater away from and prevent its discharge into the Aqueduct and other similar conveyance channels) by the end of 2001.

S Develop and implement watershed programs adjacent to appropriate conveyance channels by the beginning of 2004.

S Identify and begin implementation of necessary physical improvements by the end of 2005.

C Address water quality problems at the North Bay Aqueduct. The North Bay Aqueduct suffers from high total organic carbon and turbidity from local watershed runoff. Ongoing studies are investigating land-use “best management practices” (BMPs).

S Provide funding to implement BMPs to improve watershed runoff water quality by the end of 2002.

S By the end of 2003, study feasibility of relocating North Bay Aqueduct intake.

C Study recirculation of export water to reduce salinity and improve dissolved oxygen in the San Joaquin River. Exporting water from the Delta through the CVP and SWP at volumes greater than what is needed can establish additional flows in the San Joaquin River that could be used for salinity reduction and improving dissolved oxygen in the river.

S Develop a workplan by October 2000.

S Initiate the feasibility study of recirculation of water exported from the Delta through State and Federal water projects by the end of 2000.

S Provide a recommendation to the CALFED governing body on the use of recirculation to meet CALFED objectives by the end of 2002. The recommendation will include analysis of impacts and benefits, and recommendations on infrastructure improvements necessary to implement recirculation should it be appropriate.

Complementary Actions

The Framework identified the following actions which were not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review.

C Establish a Bay Area Blending/Exchange project. The CALFED Agencies will implement a project that enables Bay Area water districts to work cooperatively to address water quality and supply reliability concerns on a consensual basis. As noted above, water supply agencies in the Bay Area have different water sources and different water supply and water quality concerns. This is an “umbrella” project that will evaluate a range of potential changes to existing infrastructure and institutional arrangements to encourage a regional approach to water supply operations. An example is the possibility of building “interconnects” between agency supply aqueducts, so that water suppliers can take advantage of different sources when water quality is highest (e.g., existing and/or additional Sierra Nevada mountain sources). These interconnects could be more effective if used in conjunction with an expanded Los Vaqueros Reservoir, discussed above in the storage section. Another example is to arrange local water transfers, where one district pays for water conservation measures in another district in exchange for some or all of the saved, presumably higher quality water. Some reviews that may have relevance to a Bay Area Blending /Exchange project already are underway in different contexts. For example, a supplemental EIS is being prepared to analyze potential alternatives related to East Bay MUD’s contract with the Bureau of Reclamation. The Bay Area Blending/Exchange project is complementary to actions in the CALFED programmatic documents, and would help achieve objectives for water quality and water supply reliability, consistent with the CALFED solution principle of no significant redirected impacts.

S Identify potential local partners and develop agreements as needed for necessary studies by July 2001.

S Secure authorization and funding for feasibility studies by July 2001.

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- S Begin feasibility study and environmental review by July 2001, complete feasibility study by July 2002.
 - S Complete environmental review, documentation and preliminary design on a selected alternative by the end of 2003.
 - S Finalize agreements with project participants by mid-2004.
 - S Obtain necessary authorizations and funding (including any required local voter approval) by the end of 2004, and begin construction by the end of 2005.

C Facilitate water quality exchanges and similar programs. The CALFED Agencies will support efforts, consistent with overall CALFED principles, to make high quality Sierra Nevada water in the eastern San Joaquin Valley (e.g., San Joaquin River, Kings River, Kern River, and/or their tributaries) available to urban Southern California interests. The Metropolitan Water District of Southern California and the Friant Water Users Authority and its member agencies have commenced discussions to explore ways to accomplish these objectives, as well as improving water supply reliability for the agricultural districts. The CALFED Agencies will work to assure that these efforts do not affect ongoing consensus efforts to restore the upper San Joaquin River.

- S Initiate evaluations and studies of current capabilities and potential infrastructure improvements by December 2000.
- S Complete feasibility studies and identify initial projects, if any, by the end of 2001.
- S If agreement is reached by the parties involved, complete environmental review and begin implementation of a long-term program, including necessary infrastructure, by the end of 2004.

C Develop and implement within two years a plan to meet all existing water quality standards and objectives for which the State and Federal water projects have responsibility.

Funding

CALFED Agencies propose investing approximately \$950 million during Stage 1 in water quality programs. Of this investment, more than \$500 million would come from State and Federal sources and the remainder from local sources. Sources of Federal funding, in addition to future direct appropriations, include State direction of a portion of its share of Federal Safe Drinking Water Act State Revolving Fund (SRF), Clean Water Act Section 319 funds, Clean Water Act SRF and other Federal grant programs under State control. The State may use these funding sources, as available, in accordance with applicable criteria. The State's budget for FY 2000-01 includes more than \$68 million from the Proposition 13 Interim Reliable Water Supply and Water Quality Program for water quality improvement projects. Additional Proposition 13 funds will be available during Stage 1 from the Safe Drinking Water, Flood Protection Corridor, Urban Streams Restoration, Watershed Protection, Nonpoint Source Pollution Control, Clean Water, and Water Recycling programs to fund projects with water quality benefits.

2.2.10 Water Transfers

The transfer of water between willing sellers and buyers represents an economically and environmentally sound part of the State's water strategy. Voluntary water transfers provide an important water resource management tool by fostering efficient allocation of water resources throughout the State. In some areas, local water transfers are common and CALFED Agencies will continue to support such local transfers. The successful implementation of the CALFED Program depends upon access to California's major water transportation systems and removing other barriers to transfers: physical, institutional and legal. Therefore, the goal of the CALFED Water Transfer Program is to encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests.

Actions Included in the Programmatic EIS/EIR

Success of the CALFED Water Transfer Program will require the adoption of a comprehensive and progressive water wheeling policy that will require the enactment of State legislation to establish clear and concise laws governing access to and the cost of conveyance facilities as well as providing clear definitions of applicable rules and regulations.

In order to facilitate an efficient water market, DWR, SWRCB and Reclamation will focus on implementing the following elements:

- C** **Increase the availability of existing facilities for water transfers.** It is necessary to encourage and promote water transfers by facilitating "wheeling" transactions. Such transactions are paramount to the ultimate success of CALFED. Therefore, if legislation is not enacted during the 2000 legislative year to clarify the State's wheeling laws, the State administration will sponsor legislation in 2001.

- C** **Lower transaction costs through permit streamlining.** The CALFED Agencies propose to develop streamlined transfer approval procedures for certain kinds of transactions (intra-regional transfers, short-term transfers, dry-year transfers). This streamlining would include "pre-certification" of certain classes of transfers (e.g. local transfers) and expedited environmental review procedures and may necessitate legislation to implement. Actions include:
 - S** Convene a panel of stakeholders, including both transfer supporters and community representatives with concerns about transfers, to draft recommendations for a streamlined transfer approval process by December 2000.
 - S** Introduce legislative changes by April 2001.

A more active water transfer market heightens concern about the clarity of policies and procedures and the potential for third-party impacts. To respond to this and other concerns regarding better access to market information, CALFED Agencies are developing the “On-Tap” on-line water transfer information source, which will clarify application of policies and procedures and provide up-to-date information about ongoing transfer activity. This increased market information will reduce applicant and regulatory confusion and will allow third parties, including local communities, to track water transfers that may affect them and identify related outcomes from those transfers. Milestones include:

- S Provide operational On-Tap website by the end of 2000.
- S Establish California Water Transfers Information Clearinghouse to disseminate information on groundwater impacts, cumulative impacts and local socioeconomic impacts of transfers by the end of 2001.

Complementary Action

The Framework identified the following action which was not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review.

CALFED Agencies believe that in order to promote water use efficiency measures in the agricultural sector, end users need to be able to beneficially participate in an active water transfer market. CALFED Agencies recognize that one barrier to an effective water transfer market is the lack of incentive for individual landowners to utilize available water conservation technologies because any water savings frequently accrue not to the landowner but to the irrigation district or water supply agency. CALFED Agencies will develop and support proposals to remove this disincentive to voluntary deployment of water use efficiency improvements.

2.2.11 Levees

The goal of the CALFED Levee System Integrity Program is to provide long-term protection for multiple Delta resources by maintaining and improving the integrity of the extensive Delta levees system. CALFED proposes investing a total of approximately \$450 million in Stage 1.

The Delta covers 738,000 acres of productive farmland and wildlife habitat interlaced with hundreds of miles of waterways. Much of this land is below sea level. Eleven hundred miles of levees are needed to protect Delta land uses including 520,000 acres of farmland, the Mokelumne Aqueduct that crosses the Delta to serve water to the East Bay, three State highways, a railroad, natural gas and electric transmission facilities, and thousands of acres of habitat. Levees also protect water quality for Delta and export users. If a levee fails, salt water from the Bay can inundate land that is below sea level, which can seriously affect Delta water supplies for months.

The CALFED Agencies propose substantial efforts during Stage 1 to rebuild certain levees in

ways that encourage habitat for aquatic and terrestrial species. These efforts are being undertaken consistent with the Ecosystem Restoration Program and are discussed under that heading, as well as under the Conveyance Projects section. DWR and USACE will lead the CALFED Agencies in implementing the Levee System Integrity Program. Where necessary, the Reclamation and USACE will seek Congressional authorization for Delta levee improvements. The Levee System Integrity Program consists of these elements:

- C Base Level Protection.** The Program will provide base level funding to help local reclamation districts reconstruct all Delta levees to a base level of protection (the “PL 84-99 standard). Currently, about 520 out of 1,100 miles of Delta levees do not meet this standard. During Stage 1, about 200 additional miles of levee will be brought up to a base level of protection.
- C Special Improvement Projects.** This Program will enhance stability on levees that have particular importance in the system. Priorities include life and personal property (more than 400,000 people live in Delta towns and cities) water quality (preventing salinity intrusion), protecting agricultural production, and protecting ecosystems.
- C Levee Subsidence Control Plan.** Draining and cultivation of Delta marsh lands causes the peat soil to break down and compact. Over time, land has subsided from sea level so that today two-thirds of the Delta is below sea level and subject to flooding. Some points are now 21 feet below sea level. CALFED will develop “best management practices” to control and reverse subsidence and work with local districts and landowners to implement cost-effective measures.
- C Levee Emergency Response Plan.** This will enhance the ability of local, State, and Federal agencies to rapidly respond to levee emergencies.

Levees in the Suisun Marsh have been included within the scope of the Levee System Integrity Program for purposes of considering whether levees within the Suisun Marsh may need repair or improvement to accomplish other CALFED objectives (e.g., ecosystem restoration). However, the CALFED Agencies do not intend to accept any responsibility or provide any assurance for maintaining the stability of Suisun Marsh levees through their inclusion in the Levee System Integrity Program. This does not preclude any existing CALFED Agency agreements and commitments for Suisun Marsh levee maintenance.

While the CALFED Agencies may fund repairs or improvements for levees throughout the solution area, the CALFED Agencies do not intend that any levee not already deemed eligible for the non-Federal Flood Control Work rehabilitation program be converted into an eligible non-Federal Flood Control Work levee as a consequence of this ROD, and do not intend to seek legislation that would convert any existing levee into an eligible non-Federal Flood Control Work, as part of the CALFED Levee System Integrity Program. This does not constrain any CALFED Agency from implementing existing levee repair or improvement programs in the CALFED solution area.

Actions Included in the Programmatic EIS/EIR

Stage 1 actions for the CALFED Levee System Integrity Program include:

- C Initiate actions to refine the Delta Emergency Management Plan by 2000.
- C Develop a Delta Risk Management Strategy that identifies risks to Delta levees, evaluates consequences, and recommends actions by 2001.
- C Develop Best Management Practices for the reuse of dredged materials by 2001.
- C Institute a program for using bay and Delta dredge material to repair Delta levees and restore Delta habitat, targeting 2 million cubic yards of dredge material applied in Stage 1. This program must be coordinated with CVRWQCB and other interested agencies to assure that the dredge material reuse program adequately addresses concerns over salinity and the quality of dredge material. An aggressive protective dredge material reuse program will be critical to the success of both the base level program and special improvement projects.

Complementary Action

The Framework identified the following actions which was not analyzed in the Final Programmatic EIS/EIR and will, therefore, require additional environmental review.

- C Sacramento/San Joaquin River Comprehensive Study.** USACE is currently performing a Comprehensive Study of the Sacramento and San Joaquin River watersheds to improve flood control efforts. The Delta's levees play a crucial role in controlling floods and therefore in the Comprehensive Study. The CALFED Agencies intend that final development and implementation of actions under the Comprehensive Study will be coordinated and consistent with the CALFED Bay-Delta Program.

2.2.12 Science

This ROD establishes the CALFED Science Program, which will bring world-class science to all elements of the program; ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and flood management (e.g., levee stability). Performance measures and indicators for each program element will track progress.

The purpose of the CALFED Science Program is to provide a comprehensive framework and develop new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the CALFED Program (including all program components), and to communicate to managers and the public the state of knowledge of issues critical to achieving CALFED goals.

The Science Program will be developed and directed by an interim lead scientist, who will also serve in the role of lead scientist during the initial years of program implementation. Implementation of the CALFED Science Program includes implementation of the Comprehensive

Monitoring, Assessment and Research Program (CMARP), now under the direction of the interim lead scientist. The Science Program also has primary responsibility to establish the role of adaptive management in program implementation, implement strategies to reduce uncertainties that impede successful accomplishment of CALFED goals, provide programmatic review of overall implementation of mitigation measures and integrate the CALFED Science Program with existing/related agency science programs.

An overarching principle of the Science Program is adaptive management. Adaptive management is defined as using and treating actions as partnerships between scientists and managers, designing those actions as experiments with a level of risk commensurate with the status of those species involved, and bringing science to bear in evaluating the feasibility of those experiments. New information and scientific interpretations will be developed through adaptive management, as the programs progress, and will be used to confirm or modify problem definitions, conceptual models, research, and implementation actions.

In order to better integrate scientific review into the CALFED Program, the Governor and the Secretary of the Interior will appoint an independent science board to provide oversight and peer review for the overall program. Also, specific independent science panels may be convened as standing bodies or on an as needed basis. For example, the Science Program will assist with convening an independent science panel to review implementation and operation of the EWA. In addition, the existing ERP Interim Science Board will likely become the ERP Science Panel, and provide ongoing independent review of the ERP.

While much of the need for scientific review is often focused on habitat restoration efforts, the CALFED Science Program will cover all of the program components. Water supply reliability, water use efficiency and conservation, water quality, and flood management/levee stability can each benefit from the periodic review of an independent science panel to help ensure the best investments are being made and results are being achieved, as well as form strategies to reduce scientific uncertainties. The interim lead scientist will work with CALFED program managers and CALFED Agencies to develop priorities for these program areas.

In early Stage 1, the emphasis for the CALFED Science Program will be on ecosystem restoration activities, including design of effective monitoring, targeted research and development of priorities. These efforts will be based initially on the 12 uncertainties identified in the ERP Strategic Plan.

The Science Program will not be directly involved in making regulatory decisions, but rather in ensuring that CALFED, and the CALFED Agencies, are incorporating the best available knowledge into activities and decisions that are made, as well as continuously working toward narrowing scientific uncertainties, bettering knowledge, and advancing the debate. The CALFED Science Program will be conducted in an open and collaborative manner to allow and encourage involvement of stakeholder and academic science communities. The CALFED Science Program can serve as a science clearinghouse for the CALFED Agencies and identify and articulate areas of scientific uncertainty relevant to key issues.

Actions Included in the Programmatic EIS/EIR

The CALFED Science Program will accomplish the following in Stage 1:

- C Appoint an independent science board for the CALFED Program as a whole by the middle of 2001.
- C Appoint an independent science panel for the EWA by the middle of 2001.
- C Coordinate existing monitoring and scientific research programs.
- C Refine the set of ecological, operational and other predictive models that will be used in the evaluative process by the end of 2001.
- C Establish performance measures and indicators, and a consistent strategy of on-going development of these, for each of the program areas.
- C Develop an annual science report, format and content, which includes:
 - S Status of the species and effectiveness of efforts to improve conditions, including EWA, ERP and water management strategies, and provide recommendations to maximize fishery benefits while minimizing impacts to water supply.
 - S Assessment of progress and effectiveness of each program element as indicated by performance measures and indicators.
 - S Complete feasibility study to establish and construct CALFED Science Center.
 - S Recommended research and/or program adjustments.
- C Prepare first annual report by the end of 2001.

CALFED intends to invest approximately \$300 million in the science program during Stage 1.

3. PROGRAMMATIC ENVIRONMENTAL COMPLIANCE

3.1 Clean Water Act Section 404

The CALFED Preferred Program Alternative includes numerous activities that would involve the discharge of dredged or fill material to waters of the United States (including wetlands). As such, these activities require authorization under Section 404 of the Clean Water Act before they can proceed (Section 404 permits). Activities which would require Section 404 permits range from projects involving significant construction of new infrastructure (such as new surface water storage facilities) to ecosystem restoration projects (such as creating new wetland habitat by contouring land and changing local hydrology).

The USACE issues Section 404 permits. Before the USACE can issue a Section 404 permit for a project, it must determine, among other things, whether a proposed project complies with regulations issued by EPA pursuant to Section 404(b)(1) of the Clean Water Act Section 404(b)(1) Guidelines. The USACE cannot determine whether to issue a Section 404 permit for a particular project until a project-specific administrative record is developed to permit a determination as to whether the project complies with the Guidelines as well as other relevant regulatory requirements. Because project-specific evaluations for the CALFED Program will only be completed after the ROD for the Programmatic EIS/EIR, no project-specific Section 404 permits will be issued for Program projects at the time of this ROD. However, the USACE and EPA have developed a Memorandum of Understanding (MOU) to facilitate timely consideration of Section 404 permits for CALFED projects. See Attachment 4 to this ROD.

3.2 Multi-Species Conservation Strategy Conservation Agreement, Including the Federal Endangered Species Act/California Endangered Species Act/Natural Community Conservation Planning Act Commitments

While the ERP is the Program's blueprint for restoration and recovery, the MSCS is the Program's conservation and regulatory compliance strategy. The MSCS addresses the potential adverse and beneficial effects on plant and animal species of all Program actions, including ERP actions and other Program actions such as levee system integrity, water storage and water conveyance actions. Based in large part on the ERP, the MSCS' premise is that the Program as a whole, including all program elements, will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The ERP, therefore, serves two purposes: 1) to achieve Program objectives for ecosystem restoration; and 2) to enable actions from all Program elements

to be completed in compliance with FESA, CESA and NCCPA.

To serve both of these purposes, ERP implementation must be informed by the best available scientific information and by information about the implementation of other program actions. Information about the implementation of other program actions is necessary to ensure that they do not conflict with or limit the success of the ERP. In addition, ERP restoration actions must be implemented concurrently, and at commensurate levels with the other Program actions. This will ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The MSCS-ERP Milestones identified by the USFWS, NMFS and DFG are intended to establish, based on the best information currently available, a group of actions derived from the ERP Plan that 1) establish an adequate level of ERP implementation during Stage 1, 2) for the first four years, can be implemented with annual ERP funding of \$150 million, 3) would not be inhibited by proposed Stage 1 actions in other program elements, and 4) would enable proposed Stage 1 actions in other program elements to be completed in compliance with FESA, ESA and the NCCPA.

The CALFED Agencies' development of annual, near- and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, the MSCS, FESA recovery plans, and implementation plans developed for specific ecological management zones, and will be informed by the Science Program. The MSCS-ERP Milestones represent the USFWS', NMFS' and DFG's objectives for ERP implementation that would allow Covered Species to make significant progress toward restoration and recovery. As with ERP implementation priorities and strategies generally, USFWS, NMFS, and DFG intend that the Science Program will inform the MSCS-ERP Milestones. Specifically, USFWS, NMFS, and DFG will seek annual review within the Science Program of 1) whether other program elements conflict with ERP implementation priorities and strategies so as to limit the success of the ERP, and 2) whether the ERP implementation priorities and strategies will ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. As the Science Program develops information about ERP implementation, USFWS, NMFS, and DFG will revise the MSCS-ERP Milestones as necessary, consistent with the FESA and NCCPA.

USFWS, NMFS and DFG will not approve revisions to the MSCS-ERP Milestones that would cause or allow an effect to Covered Species or critical habitat designated under FESA that was not considered in the programmatic regulatory determinations, or would otherwise require the re-initiation of formal consultation under 50 CFR section 402.16. Consequently, the USFWS and NMFS expect that their approved revisions to the MSCS-ERP Milestones can be incorporated in each agency's programmatic biological opinions through informal consultation, rather than formal consultation, under section 7 of FESA. DFG will incorporate its approved revisions to the MSCS-ERP Milestones by amending the "California Department of Fish and Game Approval and Supporting Findings for the CALFED Bay-Delta Program Multiple Species Conservation Strategy."

3.3 Programmatic Endangered Species Act Section 7 Biological Opinions

Federal agencies must achieve FESA compliance under Section 7 of the act. Section 7 states that any Federal agency that funds, authorizes, or carries out an action that may affect a listed species must consult with USFWS and/or NMFS. This programmatic consultation is to ensure that the action is not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction or adverse modification of habitat critical to such species. If the lead agency determines that an agency action is likely to affect a listed species or critical habitat, the agency taking the action must initiate formal consultation. This programmatic consultation does not authorize any incidental take for listed or proposed species.

Formal consultation begins when the Federal agency provides USFWS or NMFS a written biological assessment of the action. USFWS and/or NMFS review the biological assessment and other relevant information, then do the following:

- C Determine the sufficiency of information for consultation.
- C Provide a written biological opinion that details how the action will affect any endangered species, threatened species, or critical habitat.
- C Develop reasonable and prudent alternatives to the action that will avoid jeopardizing the continued existence of such species.
- C Develop reasonable and prudent measures to the action to minimize the effects of the incidental taking.

Reasonable and prudent alternatives and reasonable and prudent measures are non-discretionary in order to be exempt from the prohibitions of take under section 9 of the Act. If the action will cause incidental take of an endangered or threatened species, USFWS and/or NMFS will provide a statement of the level of take that is anticipated to occur from implementing the action. If the Federal agency or other entity carrying out the action implements the specified measures and does not exceed the level of take stated in the biological opinion, FESA does not prohibit the incidental take caused by the action.

The MSCS served as the biological assessment for CALFED and initiated a programmatic consultation under Section 7. USFWS and NMFS have prepared programmatic biological opinions for CALFED based on the MSCS and other relevant information. See Attachment 6 to this ROD. As CALFED actions or groups of actions requiring Section 7 consultations are identified and defined, Action Specific Implementation Plans (ASIPs) can be prepared that use information and analyses in the MSCS and the programmatic biological opinions. The ASIPs will serve as the biological assessment of the CALFED actions or groups of actions; they will provide necessary details about the actions and their impacts on MSCS evaluated species and NCCP communities. USFWS and NMFS will then use the ASIPs to develop action-specific biological opinions.

CALFED Program implementation, in conjunction with the MSCS and programmatic biological opinions, will provide benefits in subsequent project-specific consultations. Specifically, individual projects that qualify for consultation will be evaluated within the context of the Program as a whole, which includes major elements designed to improve the environmental baseline and lead to the recovery of targeted species. These major elements will be subject to on-going monitoring, evaluation, and the application of adaptive management. Project-specific biological opinions will take into account the environmental benefits that accrue from the CALFED Program. As a result, FWS and NMFS anticipate that implementation of the overall CALFED Program will streamline the ESA compliance process and, as actions are taken that benefit listed species, will reduce the need for additional provisions to satisfy legal requirements.

3.4 Natural Community Conservation Plan Determination

The NCCPA authorizes the preparation of Natural Community Conservation Plans (NCCPs). NCCPs provide the means for regional or areawide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth. Federal, State, and local agencies may undertake natural community conservation planning independently or in cooperation with other persons. NCCPs must be approved by the DFG. DFG may authorize incidental take of identified species, including endangered and threatened species, whose conservation and management is provided for in an approved NCCP. Because NCCPA allows DFG to authorize incidental take of endangered and threatened species, an NCCP may be used to comply with CESA.

The MSCS has been submitted to DFG as a proposed programmatic NCCP. Based on the MSCS and other relevant information, DFG will determine whether the MSCS complies with NCCPA. If the MSCS complies with NCCPA, DFG will prepare an NCCP approval and issue supporting findings. As under FESA, when specific CALFED actions or groups of actions have been identified and defined, ASIPs that use information and analyses in the MSCS and the programmatic NCCP approval will provide necessary details about the actions and their impacts on MSCS evaluated species and NCCP communities. The ASIPs can then serve as project-specific NCCPs for CALFED actions or groups of actions. See Attachment 7 to this ROD.

3.5 Clean Water Act Section 401 Memorandum of Understanding

Under Section 401 of the CWA, the SWRCB and the RWQCBs certify whether or not federally licensed or funded projects are consistent with the maintenance or attainment of water quality requirements. The SWRCB and the RWQCBs for the San Francisco Bay and Central Valley Regions have signed a memorandum of understanding as to how they will process the Section 401 certification of the CALFED storage projects and other projects requiring such certification. See

3.6 Coastal Zone Management Act Programmatic Consistency Determination

Under the Coastal Zone Management Act (CZMA) of 1972, coastal states are required to develop Coastal Zone Management Programs, and Federal agencies are required to certify that any proposed activities in or affecting the coastal zone are consistent with the State's program. In California, the San Francisco Bay Conservation and Development Commission (BCDC) oversees the San Francisco Bay segment of California's Coastal Zone Management Program. Among other areas, BCDC also has permit jurisdiction over projects in certain waterways up to the Sacramento-San Joaquin Delta (east of Chipps Island) that empty into the Bay and in specific saltponds and managed wetlands.

The Program has prepared a Programmatic Coastal Zone Management Act Consistency Determination that documents the possible effects of the Preferred Program Alternative on coastal resources. See Attachment 9 to this ROD. The consistency determination documents the actions that the Program will take to ensure that the Preferred Program Alternative is carried out in a manner consistent, to the maximum extent practicable, with the CZMA and the California Coastal Act of 1976. BCDC has approved the consistency determination.

3.7 Permit Clearinghouse

The CALFED Agencies will establish a permit clearinghouse process to coordinate and expedite permit applications across all CALFED programs. This process will be detailed in an MOU by December 2000. As part of the clearinghouse, the CALFED Agencies will provide:

- C A permit handbook
- C Permit tracking database that tracks milestones for CALFED actions
- C A unified application format
- C A non-binding dispute resolution process
- C Annual reports and meetings to track progress
- C Permit coordinators

The CALFED Agencies, working in regulatory and/or implementation roles, will do the following as part of the permit clearinghouse process:

- C Participate in regular meetings and assist in preparation of annual reports to track progress on overall CALFED program implementation.
- C Identify and pursue regional environmental permits, opportunities to group permits, a single


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- environmental review process for multiple projects, or other measures that increase the efficiency of environmental compliance efforts.
- C Appoint a single point of contact for their agency and as appropriate, a single point of contact for regulatory compliance activities.
 - C Form multi-agency, multi-disciplinary teams to assist in project definition, impact analysis, identification of avoidance and mitigation measures, development of permit conditions and information necessary to comply with regulatory requirements.
 - C Develop standard guidance, study methodologies, and mitigation requirements as needed.
 - C Respond in a timely manner to environmental documents, permit applications, other regulatory requirements.
 - C Ensure that environmental considerations are an integral part of project formulation.
 - C Identify issues in dispute early, attempt to resolve those issues at the lowest level possible, and elevate those issues as needed in an orderly manner so that they can be resolved and not result in delays.

The permit clearinghouse concept does not provide CALFED projects with any higher priority than other projects submitted by non-CALFED Agencies. The CALFED Agencies will support increases in regulatory staff to assure all CALFED and non-CALFED projects submitted for permitting have equal priority and that the CALFED Program schedule will be met. In addition, the permit clearinghouse does not change the standard of review under statutes governing the review of each regulatory agency.

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt this Record of Decision. By signing this Record of Decision together, we exercise our respective authorities over only those portions relevant to our authority.

Signed and dated:

United States of America



Bruce Babbitt, Secretary
U.S. Department of the Interior

AUG 28 2000

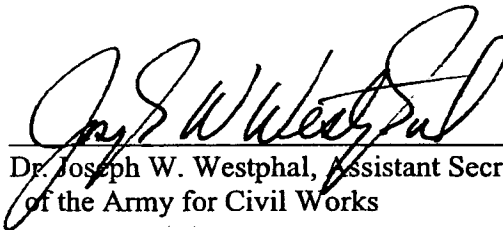
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Carol M. Browner, Administrator
U.S. Environmental Protection Agency

AUG 28 2000

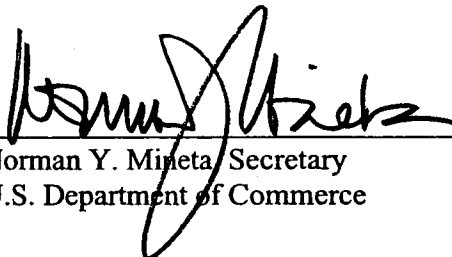
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Dr. Joseph W. Westphal, Assistant Secretary
of the Army for Civil Works

29 AUG 2000

Date



Norman Y. Mineta, Secretary
U.S. Department of Commerce

8-28-00


Date



Richard E. Rominger, Deputy Secretary
U.S. Department of Agriculture

8-28-00

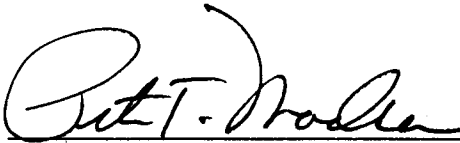
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Felicia Marcus, Regional Administrator
U.S. Environmental Protection Agency

8/28/00

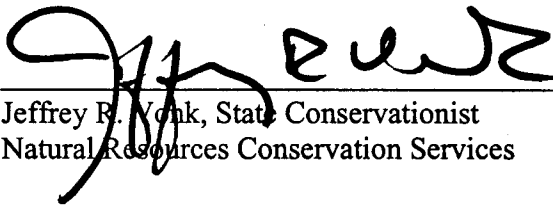
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Brigadier General Peter T. Madsen, Commander
South Pacific Division
U.S. Army Corps of Engineers

28 Aug 00

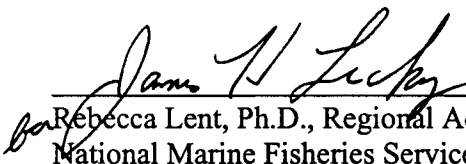
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Jeffrey B. Vonk, State Conservationist
Natural Resources Conservation Services

8-28-00

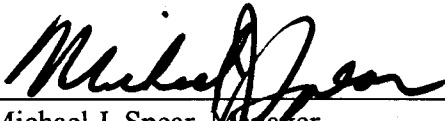
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Rebecca Lent, Ph.D., Regional Administrator
National Marine Fisheries Service

8/28/00

Date



Michael J. Spear, Manager
California-Nevada Operations
U.S. Fish and Wildlife Service

8/28/00

Date

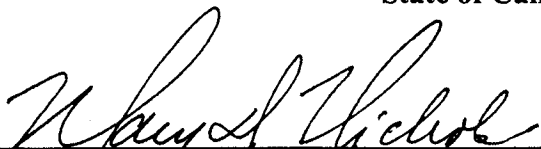


Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation

8/28/00

Date

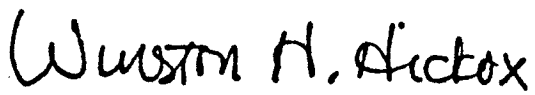
State of California



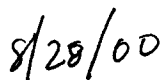
Mary D. Nichols, Secretary
California Resources Agency



Date



Winston H. Hickox, Secretary
California Environmental Protection Agency



Date



APPENDIX A

Mitigation Measures Adopted in the Record of Decision

Appendix A

Mitigation Measures Adopted in the Record of Decision

The CALFED Agencies commit to considering and adopting the following mitigation measures where appropriate in development and implementation of project specific actions. The mitigation measures address short-term, long-term and cumulative effects of the CALFED Program. The measures are grouped by section from the impact analysis chapters of the Final Programmatic EIS/EIR.

5.1 Water Supply and Water Management. Potentially significant effects of implementing the Preferred Program on water supply and water management include temporary local water supply interruptions due to turbidity of water during construction of Program facilities, levee construction and maintenance, and habitat restoration activities.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on water supply and water management:

1. Use best construction and drainage management practices to avoid transport of soils and sediments into waterways.
2. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
3. Use sediment curtains to contain turbidity plumes during dredging.
4. Schedule ground disturbing construction during the dry season.

5.3 Water Quality. Implementation of the Preferred Program Alternative may have several potentially significant effects on water quality. These effects include: (1) Releases of inorganic and organic suspended solids into the water column and turbidity resulting from increased erosion during construction, dredging, or drainage of flooded lands; (2) Releases of toxic substances, such as pesticides, selenium, and heavy metal residues, into the water column during construction and dredging and other Program actions; (3) Net increases in salinity if evaporation increases converting irrigated cropland to wetlands; (4) Increased electrical conductivity (a measure of salinity) of water in the Delta; (5) Increases of TOC in river water caused by the increased contact between flowing or ponded water and vegetation or peat soils that would result from conversion of agricultural lands to wetlands and from actions in other Program elements; (6) Increased water temperatures and resultant decreased dissolved oxygen concentrations due to the increased residence time of water in the Delta and from actions in various Program elements; (7) Decreases in in-stream water quality if water use efficiency measures or water transfers reduce diluting flows; (8) Increases in concentrations of constituents of concern if water transfers reduce in-stream flows and deplete river assimilative capacity; (9) Increase in methylation of mercury in constructed shallow-water habitat; (10) Degradation of surface water by the transfer of poorer quality groundwater; (11) Changes in natural flow regimes in areas where new surface storage is built; and (12) Surface storage inundation of toxic material.

The following mitigation measures will reduce potential effects of implementation of the Preferred

Program Alternative on water quality:

1. Improve treatment levels provided at municipal wastewater treatment plants to upgrade the quality of the constituents of concern discharged to receiving waters in order to compensate for the reduction in dilution caused by improved water use efficiency. Improved salt management of wastewater inputs to treatment plants could reduce salt concentrations in discharges.
2. Release additional water from enlarged or additional off-stream surface storage, or from additional groundwater storage.
3. Release additional water from storage in existing reservoirs or groundwater basins.
4. Treat wastewater at the source, such as Delta drains, upgrade water treatment processes at drinking water treatment plants and/or provide treatment at the point of use (consumer's tap).
5. Use innovative, cost-effective disinfection processes (for example, UV irradiation, and ozonation, in combination with other agents) that form fewer or less harmful DBPs.
6. Use existing river channels for water transfers and timing the transfers to avoid adverse water quality effects.
7. Use best construction and drainage management practices to avoid transport of soils and sediments into waterways.
8. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
9. Use sediment curtains to contain turbidity plumes during dredging.
10. Separate water supply intakes from discharges of agricultural and urban runoff.
11. Apply agricultural and urban BMPs, and treat drainage from lands with concentrations of potentially harmful constituents to reduce contaminants. Treat drainage from agricultural lands underlain by peat soils to remove TOC.
12. Relocate diversion intakes to locations with better source water quality.
13. Restore additional riparian vegetation to increase shading of channels and reduce evaporation.
14. Identify and investigate issues regarding beneficial reuse of dredged material, including conducting core sampling and analysis of proposed dredged areas, and implement engineering solutions to avoid or prevent environmental exposure to toxic substances after dredging.
15. Cap exposed toxic sediments with clean clay/silt and protective gravel.
16. Test for mercury in soils and locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediments are implemented.
17. Operate storage facility operations to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream water quality and habitat.
18. Avoid inundation or design solutions to inundation of toxic materials, such as covering with an engineered cap.
19. Schedule ground disturbing construction during the dry season.
20. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
21. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

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- The criteria for future water transfer proposals include:
- C Water rights of all legal water users must not be impaired.
 - C Transfers must not harm fish and wildlife resources and their habitats.
 - C Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.
22. Develop new groundwater basin management plans or expand existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
 23. Reduce or discontinue groundwater pumping.
 24. Monitor and test groundwater wells and aquifers.
 25. Continue the studies concerning reuse of beneficial Bay dredge material in the Delta for potential water quality impacts related to salinity, metals mobilization, and other environmental and health hazards.
 26. Investigate all potential sources of borrow and the cost effectiveness of each source's use for levee rehabilitation and construction, including the use of sediment traps as a source of borrow.
 27. Prepare a borrow plan that includes future costs and options for obtaining adequate quantities of borrow needed for implementation of the Levee System Integrity Plan.
 28. Modify water conveyance operations, including DCC and south Delta operations. Program implementation will occur in phases to permit new information gained from studies and monitoring to influence changes in facility design and operations.

5.4 Groundwater. Implementation of the Preferred Program Alternative may have potentially significant effects on groundwater. These effects include: (1) Changes in groundwater levels; (2) Increased demand for groundwater supplies; (3) Increased groundwater overdraft; (4) Increased land subsidence; (5) Increased degradation of groundwater quality from contaminant movement, salt-water intrusion, or naturally poor-quality water drawn into the aquifer; and (6) Impacts from groundwater recharge and storage system operations.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on groundwater:

1. Create additional groundwater or surface water storage facilities to improve water supply reliability and decrease overdraft.
2. Support voluntary transfers of water from basins with excess supplies.
3. Purchase water rights from willing sellers (including transferring water rights between sectors—for example, from agricultural to municipal uses).
4. Support local groundwater management that reduces overdraft and third-party effects, including reduction or discontinuation of groundwater pumping.
5. Implement conservation measures to reduce demand.
6. Integrate the Ecosystem Restoration Program floodplain restoration efforts with setback levees.
7. Support local and regional efforts to increase water supplies from recycling.

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8. Support increased regulations regarding new and existing domestic wells and septic systems.
 9. Develop alternative water supplies.
 10. Monitor and test groundwater wells and aquifers.
 11. Limit new septic tank systems in vulnerable areas.
 12. Allow water levels to increase periodically.
 13. Import new soil (including dredged spoil) to raise land surface.
 14. Support local projects to recharge aquifers.
 15. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
 16. Treat extracted groundwater at the well head.
 17. Dilute poor-quality groundwater with higher quality water.
 18. Support local agencies in developing new groundwater basin management plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
 19. Temporarily remove the recharge system from service to avoid effects associated with high water tables.
 20. Monitor water-level conditions on islands adjacent to flooded Delta islands.
 21. Install interception wells at in-Delta storage facilities to control seepage.
 22. Line conveyance canals to prevent seepage.
 23. Control seepage through pumping and other appropriate measures.
 24. Design new levees and improve existing levees to withstand hydraulic stresses and seepage from flooding Delta islands.
 25. Utilize the criteria and objectives in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - Water rights of all legal water users must not be impaired.
 - Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.

5.5 Geology and Soils. Implementation of the Preferred Program Alternative may have potentially significant effects on geology and soils. These effects may include: (1) Conversion of agricultural land soils for levee system construction and potential for erosion on outboard slope of levees; (2) Increases in local subsidence from potential increased reliance on groundwater use; (3) Increases in wind and soil erosion and in soil salinity due to fallowed agricultural lands; (4) Increased construction-related short-term soil erosion, and increased sediment deposition and soil compaction; (5) Potential changes in downstream geomorphology from enlarging existing storage facilities and other Program actions; and (6) Ground disturbance, inundation, seepage, and shoreline wind- and wave-generated erosion from new storage facilities and other Program actions.

The following mitigation measures will reduce potential effects of implementation of the Preferred

Program Alternative on geology and soils:

1. Monitor groundwater levels and subsidence in areas of increased reliance on groundwater resources and regulate withdrawal rates at levels below those that cause subsidence.
2. Minimize and avoid direct groundwater transfers or groundwater substitution transfers from regions: 1) experiencing long-term overdraft, 2) where subsidence historically has occurred, or 3) where local extensometers indicate that subsidence rates are increasing.
3. Protect flooded Delta island inboard levee slopes against wind and wave erosion with vegetation, soil matting, or rock.
4. Protect exposed soils with mulches, geotextiles, and vegetative ground covers during and after project construction activities in order to minimize soil loss.
5. Implement erosion control measures and bank stabilization projects.
6. Increase sediment deposition and provide substrate for new habitat by planting terrestrial and aquatic vegetation.
7. Measure channel morphology over time to monitor changes and implement erosion control measures where needed.
8. Re-use dredged materials to reduce or replace soil loss.
9. Leave crop stubble from previous growing season in place while fallowing and employ cultivation methods that will cause the least amount of disturbance in order to minimize erosion of surface soils.
10. Limit the salinity of replacement water, relative to local conditions, in water transfers.
11. Ensure that the volume of irrigation water used is sufficient to flush accumulated salts from the root zone.
12. Operate new storage facilities to minimize sediment trapping and increase sediment transport in rivers and tributaries.
13. Retrofit soil-comprised structures to seismic events with shock-absorbing devices and materials in areas of seismic vulnerability, wherever possible.
14. Prepare and implement best construction management plans.
15. Prepare and implement a water quality and soils monitoring program.
16. Prepare and implement construction mitigation plans.
17. Prepare and implement contingency plans for wetland and marshland restoration.
18. Modify storage facility operations to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream habitat.
19. Control boat traffic in order to reduce boat wakes to levels that will not cause levee or bank erosion.
20. Monitor water-level conditions on islands adjacent to in-Delta storage.
21. Install interception wells at in-Delta storage facilities to control seepage.
22. Line conveyance canals to prevent seepage.
23. Control seepage through pumping and other appropriate measures.
24. Design new levees and improve existing levees to withstand hydraulic stresses and seepage from flooding Delta islands.
25. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
26. Use sediment curtains to contain turbidity plumes during dredging.
27. Investigate the cost effectiveness and safety of using sediment traps as a source of borrow.

5.6 Noise. Implementation of the Preferred Program Alternative may have potentially significant effects on noise. These effects may include: (1) Increased noise from heavy equipment operation during construction; (2) Noise from construction-related traffic along major access and haul routes and construction labor force vehicle traffic; (3) Increased noise from facility operation of spillways, pumping generating plants, and switchyards; (4) Increased noise from automobile or boat traffic associated with recreational use at enlarged reservoirs; and (5) Increased traffic noise from permanently relocated roadways.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on noise:

1. Use electrically powered equipment instead of internal combustion equipment where feasible.
2. Locate staging and stockpile areas, and supply and construction vehicle routes as far away from sensitive receptors as possible.
3. Establish and enforce construction site and haul road speed limits.
4. Restrict the use of bells, whistles, alarms, and horns to safety warning purposes.
5. Design equipment to conform with local noise standards.
6. Locate equipment as far from sensitive receptors as possible.
7. Equip all construction vehicles and equipment with appropriate mufflers and air inlet silencers.
8. Restrict hours of construction to periods permitted by local ordinances.
9. Locate noisy equipment within suitable sound-absorbing enclosures.
10. Erect sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
11. Schedule construction activities to avoid breeding seasons of sensitive species and peak recreating use.
12. Locate redirected roadways away from sensitive receptors.
13. Encourage use of public transportation and carpooling for construction workers.
14. Restrict boating speeds or access to areas with sensitive receptors.
15. Conduct project-specific noise analyses for actions with noise impacts.

5.7 Transportation. Implementation of the Preferred Program Alternative may have potentially significant effects transportation. These effects may include: (1) Increasing local traffic flows as the public accesses recreational resources at new storage facilities; (2) Changing traffic flows as roads are temporarily rerouted around construction sites; (3) Relocating or permanently closing roads; (4) Delays and disruptions resulting from detouring traffic as new roadways and railroad bridges are constructed around storage and conveyance facilities; (5) Adding construction vehicles to existing traffic levels, especially on narrow, two-lane local roads with winding routes; (6) Closing two-lane roads to one lane in order to facilitate roadway improvements or relocations associated with the Watershed Program; (7) Impeding or blocking patrol or rescue boats in Delta channels where fish barriers and flow control structures are installed; and (8) Creating safety conflicts by operating large, slow-moving dredging equipment on Delta waterways.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on transportation:

1. Provide convenient and parallel detours to routes closed during construction.
2. Allow trains to use existing tracks while bridges are being built.
3. Encourage use of public transportation and carpooling for construction workers.
4. Clearly mark roadway intersections with warnings where visibility is poor in the project vicinity.
5. Provide boat portage or a stationary jib crane.
6. Relocate boat launch facilities.
7. Relocate emergency access roads.
8. Require contractors to follow appropriate state and federal safety protocols.
9. Coordinate dredging and safety precautions with state and local authorities.
10. Schedule construction at times and seasons to minimize delays.
11. Expand public transportation resources and local roadways.
12. Expand public transportation, roads, and highways.
13. Locate roadways in areas with fewer conflicts.
14. Design roadways to avoid or minimize traffic congestion.

5.8 Air Quality. Implementation of the Preferred Program Alternative may have potentially significant effects on air quality. These effects may include: (1) Direct, short-term air pollutant emissions during construction activities; (2) Fugitive emissions of wind-blown dust; (3) Emissions associated with prescribed burning programs; (4) Emissions from increases in equipment use and cultivation, agricultural chemical use, and crop shifting and burning; (5) Emissions if land use changes lead to higher recreational uses; and (6) Emissions from use of fossil fuels or other energy resources associated with pressurized irrigation systems; and (7) Indirect air quality impacts from increased power generation to meet Program energy consumption and changes in operation.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on air quality:

1. Set traffic limits on construction vehicles.
2. Maintain properly tuned equipment.
3. Limit the hours of operation or amount of equipment.
4. Limit the use of agricultural chemicals.
5. Coordinate prescribed burning programs with relevant air quality management agencies to ensure that the programs are accounted for in air quality management plans.
6. Regularly water construction sites to control levels of dust in the air.
7. Use soil stabilizers and dust suppressants on unpaved service roadways.
8. Conduct daily contained sweeping of paved surfaces.
9. Limit vehicle idling time.
10. Use alternatively fueled equipment.
11. Require selection of borrow sites that are closest to fill locations.
12. Implement construction practices that reduce generation of particulate matter.

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13. Hydoseed and mulch exposed areas.
 14. Use cultivation practices that minimize soil disturbance.
 15. Follow air basin management plans to avoid or minimize vehicle-related emissions.
 16. Restrict the kinds of recreational vehicles or the times of operation for certain off-road vehicles on fallowed agricultural land to limit the amount of fugitive dust.
 17. Implement prescribed burning during favorable weather conditions.
 18. Implement alternatives to crop burning including tilling and shallow flooding.
 19. Coordinate crop stubble burning with relevant air quality management agencies to ensure that the programs are accounted for in air quality management plans.
 20. Encourage use of public transportation and carpooling for construction workers.
 21. Obtain replacement power from non-emitting sources such as other hydro, solar, and wind sources. This can occur through construction of, or the use of incentives to construct non-emitting power plants. This approach is consistent with state and federal policies related to promoting use of renewable resource type generation as expressed in Public Utility Code Section 381(c) (part of what is commonly referred to as AB 1890) and Executive Order 12902.
 22. Utilize the best available control technology for new power production facilities.

6.1 Fisheries and Aquatic Systems. Implementation of the Preferred Program Alternative may have potentially significant effects on fisheries and aquatic systems. These effects may include: (1) Increased non-native species abundance and distribution to levels detrimental to native species from reestablishment of aquatic areas; (2) Blocked access to habitat and altered water quality and flow conditions from placement of barriers in the south Delta; (3) Altered natural ecosystem structure, removal of benthic communities, and creation of conditions that may damage habitat for desired species from dredging activities and other Program actions; (4) Release of toxic substances into surface waters; (5) Short-term disturbance of existing biological communities and species habitat, mobilized sediments, and input contaminants from construction activities; (6) Reduced streamflow and Delta outflow, changed seasonal flow and water temperature variability from water supply management, and changes in salinity associated with several Program elements resulting in reduced habitat abundance, impaired species movement, and increased loss of fish to diversions; (7) Increased entrainment loss of chinook salmon and other species from diversions to new off-stream and in-Delta storage; (8) Reduced frequency and magnitude of net natural flow conditions in the south and central Delta from Delta Cross Channel operations and south Delta barriers resulting in reduced system productivity, impaired species movement, and increased losses to diversions; (9) Reduced net flow conditions in the Sacramento River downstream of the diversion facility on the Sacramento River; (10) Increased fish mortality through abrasion, increased predation, and other factors from the new fish screen facility for the diversion facility on the Sacramento River; and (11) Delayed migration and reduced spawning success for adult fish moving from the Mokelumne River channels into the Sacramento River from fish screens and a diversion facility on the Sacramento River.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on fisheries and aquatic systems:

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1. Implement BMPs, including a storm water pollution prevention plan, toxic materials control and spill response plan, and vegetation protection plan.
 2. Limit construction activities to windows of minimal species vulnerability.
 3. Create additional habitat for desired species, including increased aquatic area and structural diversity through construction of setback levees and channel islands.
 4. Control undesirable non-native species.
 5. Operate new and existing diversions to avoid and minimize effects on fish--avoid facility operations during periods of high species vulnerability.
 6. Locate the diversion points to avoid primary distribution of desired species.
 7. Control predators in the diversion facility (screen bays) and modify diversion facility structure and operations to minimize predator habitat.
 8. Construct a barrier to fish movement on Georgiana Slough.
 9. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.
 10. Identify and investigate issues regarding beneficial reuse of dredged material, including conducting core sampling and analysis of proposed dredged areas, and implement engineering solutions to avoid or prevent environmental exposure to toxic substances after dredging.
 11. Cap exposed toxic sediments with clean clay/silt and protective gravel.
 12. Locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.
 13. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
 13. Use sediment curtains to contain turbidity plumes during dredging.
 14. Schedule ground disturbing construction during the dry season.
 15. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
 16. Utilize the criteria and objectives in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - C Transfers must not harm fish and wildlife resources and their habitats.

6.2 Vegetation and Wildlife. Implementation of the Preferred Program Alternative may have potentially significant effects on vegetation and wildlife. These effects may include: (1) Temporary and permanent loss and degradation of wetland, riparian and other natural communities; (2) Substantial temporary or permanent loss and disturbance of wintering waterfowl foraging habitat; (3) Substantial decrease in important upland wildlife habitat and use areas; (4) Temporary and permanent fragmentation of riparian habitats and/or wildlife movement corridors; (5) Temporary or permanent loss of habitat or direct impacts on special-status species; (6) Loss of portions of rare natural communities and significant natural areas; (7) Temporary disturbance or mortality of special-status species due to construction and habitat management activities; (8) Permanent loss of incidental wetland and riparian habitats that depend on agricultural inefficiencies; and (9) Reduction in quantity or quality of forage for species of concern.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on vegetation and wildlife:

1. Avoid direct or indirect disturbance to wetland and riparian communities, special-status species habitat, rare natural communities, significant natural areas, and other sensitive habitat.
2. Restore and enhance sufficient in-kind wetland and riparian habitat or rare natural communities and significant natural areas at offsite locations (near project sites) before or at the time that project impacts are incurred. Replace not only acreage lost, but also habitat value loss.
3. Design Program features to permit on-site mitigation or nearby restoration of wetland, riparian habitat, special-status species habitat, rare natural communities, and significant natural areas that have been removed by permanent facilities.
4. Phase the implementation of Ecosystem Restoration Program habitat restoration to offset temporary habitat losses and to restore habitat (including special-status species habitat) before, or at the same time that, project impacts associated with the Ecosystem Restoration Program are incurred.
5. Restore wetland and riparian communities, special-status species habitat, and wildlife use areas temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.
6. Avoid creating wetlands in areas with high concentrations of mercury in sediments and anaerobic conditions.
7. Phase the implementation of modifications to levees that would be necessary to meet PL 84-99 standards in order to minimize the effects of fragmentation of riparian habitats and associated wildlife.
8. Implement BMPs such as avoiding disturbance to highly erodible soils and installing siltation barriers and detention basins to reduce the potential for siltation of nearby wetlands.
9. Maintain sufficient outflow downstream of constructed off-stream reservoirs to maintain existing downstream wetland riparian communities.
10. Restore or enhance sufficient waterfowl foraging habitat near existing use areas to offset impacts on the abundance, quality and availability of waterfowl forage. Restoration and enhancement actions include restoring and managing seasonal wetlands for wintering waterfowl, producing crops with high forage value (such as corn and rice), and modifying farming practices to increase forage availability (for example, leaving portions of forage crops unharvested through winter or shallowly flooding fields).
11. Avoid important wildlife habitat areas, such as critical deer winter range and fawning habitat.
12. Restore and enhance important wildlife habitat use areas temporarily disturbed by on-site construction activities by planting and maintaining native species immediately following construction.
13. Restore and enhance upland habitat areas within affected watersheds or in other watershed

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- if sufficient habitat enhancement is unavailable within the affected watershed. This could include modifying existing land management practices (for example, grazing and fire management practices) to improve conditions for the natural reestablishment and long-term maintenance of affected plant communities and habitats.
14. Avoid direct or indirect disturbance to areas occupied by special-status species.
 15. Avoid construction or maintenance activities within or near occupied special-status species habitat areas or important wildlife use areas when species may be sensitive to disturbance, such as during the breeding season.
 16. Restore habitat areas occupied by special-status species that are temporarily disturbed by on-site construction activities immediately following construction.
 17. Restore and enhance suitable habitat areas that are occupied by, or are near and accessible to, special status species that have been affected by the permanent removal of occupied habitat areas.
 18. Phase habitat restoration actions to restore sufficient suitable habitat to minimize the adverse affects of impacts on occupied special-status species habitats before impacts are incurred.
 19. For species for which relocation or artificial propagation is feasible, establish additional populations of special-status species adversely affected by the Program in suitable habitat areas elsewhere within their historical range.
 20. Provide incentives to alter agricultural practices to improve habitat conditions for affected special-status species that use agricultural lands. This could included planting and managing crops to increase the availability or quantity of forage for affected species.
 21. Avoid direct or indirect disturbances to rare natural communities and significant natural areas.
 22. Restore or enhance disturbed rare natural communities or significant natural areas at off-site locations before, or when, Program actions that could affect these communities are incurred.
 23. Restore rare natural communities or significant natural areas at or near affected locations after Program activities are completed.
 24. Manage recreation-related activities on lands managed under the Program to minimize or avoid potential adverse effects of recreation-related activities on sensitive habitats, important wildlife use areas, and special-status species.
 25. Phase ERP to initially restore natural waterfowl foraging on agricultural lands with low forage value while restored habitat with high forage value develops.
 26. Phase ERP to initially restore wetland habitat with high forage value to offset the loss of agricultural foraging habitat that may result from the ERP.
 27. Restore riparian vegetation disturbed by on-site construction activities immediately following construction.
 28. Restore or enhance sufficient in-kind riparian habitat at off-site locations, near project sites, in a manner that reduces the degree of existing habitat fragmentation before, or when, project impacts are incurred to offset habitat losses.
 29. Restore habitat temporarily disturbed by on-site construction activities immediately following construction.
 30. Restore rare natural communities, significant natural areas, and wildlife use areas

temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.

31. Restore and enhance suitable habitat areas that are occupied by, or are near and accessible to, special-status species that have been adversely affected by the permanent removal of occupied habitat areas.

7.1 Agricultural Land and Water Use. Implementation of the Preferred Program Alternative may have potentially significant effects on agricultural land and water use. These effects may include: (1) Conversion of prime, statewide important, and unique farmlands to project uses; (2) Conflicts with local government plans and policies; and (3) Conflicts with adjacent land uses.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on agricultural land and water use:

1. Site and align Program features to avoid or minimize effects on agriculture.
2. Examine structural and nonstructural alternatives to achieve project goals in order to avoid effects on agricultural land.
3. Implement features that are consistent with local and regional land use plans.
4. Involve all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource effects and benefits.
5. Retain water allocations from retired drainage-impaired lands within the existing water districts.
6. Support the testing and application of alternative crops to idled farmland (for example, agroforestry or energy crops).
7. Provide water supply reliability benefits to agricultural water users.
8. Support the California Farmland Conservancy Program in acquiring easements on agricultural land in order to prevent its conversion to urbanized uses and increase farm viability. Focus on lands in proximity to where any conversion effect takes place.
9. Restore existing degraded habitat as a priority before converting agricultural land.
10. Focus habitat restoration efforts on developing new habitat on public lands before converting agricultural land.
11. If public lands are not available for restoration efforts, focus restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).
12. Use farmer-initiated and developed restoration and conservation projects as a means of reaching Program goals.
13. Where small parcels of land need to be acquired for waterside habitat, seek out points of land on islands where the ratio of levee miles to acres farmed is high.
14. Obtain easements on existing agricultural land for minor changes in agricultural practices

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- (such as flooding rice fields after harvest) that would increase the value of the agricultural crop(s) to wildlife.
15. Include provisions in floodplain restoration efforts for compatible agricultural practices.
 16. Purchase water for habitat purposes so that the same locality is not affected over the long term.
 17. Use a planned or phased habitat development approach in concert with adaptive management.
 18. Minimize the amount of water supply required to sustain habitat restoration acreage.
 19. Develop buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.
 20. In implementing levee reconstruction measures, work with landowners to establish levee reconstruction methods that avoid or minimize the use of agricultural land.
 21. Work with landowners to establish levee subsidence BMPs that avoid effects on land use practices. Through adaptive management, further modify BMPs to reduce effects on agricultural land.
 22. Implement erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetation areas with native riparian plants and wet meadow grasses.
 23. Protect exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.
 24. Use rotational fallowing to reduce selenium drainage.
 25. When it appears that land within an agricultural preserve may be acquired from a willing seller by a State CALFED agency for a public improvement as used in Government Code Section 51920, advise the Director of Conservation and the local governing body responsible for the administration of the preserve of the proposal.
 26. Limit the number of acres that can be fallowed (in order to produce transferrable water) in a given area (district or county) or the amount of water that can be transferred from a given area.
 27. Support assistance programs to aid local entities in developing and implementing groundwater management programs in water transfer source areas.
 28. Dredged materials will be analyzed, dredged and handled in accordance with permit requirements. Permits will incorporate mitigation strategies identified in Section 5.3 to prevent release of contaminants of concern.
 29. Utilize the criteria and objectives in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - C Water transfers must be voluntary.
 - C Water market transactions must result in the transfer or exchange of water that truly increases the utility of the supply, not water that a transferor has never used or water that would have been legally available for downstream use in the absence of a transfer.
 - C Water rights of all legal water users must not be impaired.
 - C Transfers must not cause overdraft or degradation of groundwater basins, or impair

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- correlative rights of overlying users.
 - C Entities receiving transferred water should be required to show that they are making efficient use of existing water supplies.
 - C Water rights holders (whether districts or individuals) must play a strong role in determining whether water to which they have a right is transferred.
 - C The beneficial and adverse impacts on fiscal integrity of the districts and on the economy of agricultural communities in source and receiving areas cannot be ignored.
30. Implement seepage control measures.
 31. Support local groundwater management that reduces overdraft and third-party effects, including reduction or discontinuation of groundwater pumping.

7.4 Urban Land Use. Implementation of the Preferred Program Alternative may have potentially significant effects on urban land use. These effects may include: (1) Displacement of some existing commercial uses and residents from Program actions located in urban land use areas; (2) Physical disruption or division of established communities; and (3) Potential conflicts of habitat development and storage and conveyance facilities with general plan land use designations or zoning if located in urban use areas.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on urban land use:

1. Select and design program actions that minimize the displacement of existing residents.
2. Select and design Program actions that do not physically disrupt or divide established communities.
3. Select Program actions that are consistent with local and regional land use plans. This could include consulting and working with local jurisdictions affected by Program actions early in the planning and environmental review process.
4. Notify all affected persons (for example, residents, property owners, school officials, and business owners) in the project area of the construction plans and schedules. This could include arranging schedules for road detours with residents and businesses to maintain access to homes, schools, and businesses; as well as providing protection, relocation, or temporary disconnection of utility services.
5. Select and design Program actions that do not physically disrupt or divide established communities.
6. Minimize the amount of permanent easement required for construction of facilities and consult with property owners to select easement locations that would lessen property disruption and fragmentation.
7. Relocate roads and utilities prior to project construction to ensure continued access and utility service through the project area.
8. Prepare a detailed engineering and construction plan as part of the project design plans and specifications, and include procedures for rerouting and excavating, supporting, and filling areas around utility cables and pipes in this plan.
9. Verify utility locations through consultation with appropriate entities and field surveys

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- (such as probing and pot-holing).
10. Reconnect disconnected cables and lines promptly.

7.6 Utilities and Public Services. Implementation of the Preferred Program Alternative may have potentially significant effects on utilities and public services. These effects may include: (1) Need for relocation or modification of major infrastructure components; and (2) Increased risk of gas line rupture during construction.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on utilities and public services:

1. Site project facilities and transmission infrastructure to avoid existing infrastructure.
2. Construct overpasses, small bridges, or other structures to accommodate existing infrastructure.
3. Coordinate construction activities with utility providers.
4. Design and operate facilities to minimize the amount of energy required and to maximize the amount of energy created.
5. Design project facilities to avoid or minimize their effect on existing infrastructure.

7.7 Recreation. Implementation of the Preferred Program Alternative may have potentially significant effects on recreation. These effects may include: (1) Temporary closure of recreation areas during construction; (2) Decrease in recreation opportunities and increases in boat traffic in some areas due to speed zone restrictions or prohibition of motorized boating in some areas; (3) More stringent enforcement of boat discharges; (4) Temporary or permanent changes in boating access and navigation; (5) Permanent closure of recreation facilities; (6) Potential decrease in flooded lands suitable for wildlife, hunting, and fishing as a result of water use efficiency actions; (7) Reduced water-contact recreation quality from cold water reservoir releases; (8) Displacement of fish and wildlife and loss of terrestrial and loss of on-stream recreation from new off-stream or expanded on-stream reservoirs; (9) Potential for reduced access to recreation facilities and decreased recreation opportunities from changes in reservoir levels; and (10) Potential short-term construction effects of dredging, such as obstructing or closing channels and creating noise and visual effects.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on recreation:

1. Incorporate project-level recreation improvements and enhancements.
2. Work with recreational interests to protect and enhance recreation resources.
3. Conduct an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.
4. Identify and mark alternate boating routes.
5. Restoring and designing existing and new levees to accommodate vehicular access and parking for shoreline fishing, boat launching, swimming, hiking, bicycling, and wildlife

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- viewing where feasible.
 6. Maintain boating access to prime areas.
 7. Construct portage facilities.
 8. Construct boat locks.
 9. Provide public information regarding alternate access.
 10. Avoid construction during peak-use seasons and times.
 11. Post warning signs and buoys in channels.
 12. Provide in-kind recreation facilities.
 13. Maintain reservoir levels as high as feasible during the recreation season, given regulatory and other operational constraints.
 14. Minimize water level fluctuation and establish minimum pool levels.
 15. Coordinate operation of all reservoir facilities to minimize adverse reservoir fluctuations in any particular facility consistent with regulatory and other operational constraints.
 16. Purchase trail rights-of-way or recreational easements.
 17. Provide or improve vehicle access and parking for recreation areas.
 18. Provide access to waterfront areas and island edges.
 19. Create new day-use boating and camping areas.
 20. Relocate or construct new recreation facilities and infrastructure.

7.8 Flood Control. Implementation of the Preferred Program Alternative may have potentially significant effects on flood control. These effects may include: (1) Effects on levee stability from levee and berm vegetation management practices for habitat purposes; (2) Reduced levee stability from habitat restoration using conservation easements along riparian corridors; (3) Increased seepage on adjacent islands, possibly leading to flooding from seepage-induced failure from shallow flooding of Delta islands susceptible to subsidence; (4) Increases in wind-fetched and wave erosion on landside levee slopes from island flooding; (5) Increased levels of flooding downstream of diversions after removal of diversion structures and other obstructions to flow in the Sacramento River tributaries; (6) Increased flood stages along small streams due to increases in the roughness of the stream channel from vegetation on stream banks; (7) Levee slumping and cracking caused by groundwater overdraft and subsidence; and (8) Increased stage upstream of and possible decreased stage downstream from gate structures located in channels that reduce the channel's flood flow conveyance.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on flood control:

1. Allow reasonable clearing of deep-rooted trees and shrubs from levee side slopes to support inspection, maintenance, repair, and emergency response, while preserving habitat values.
2. Permit clearing of deep-rooted shrubs and trees on levee side slopes. Trees and shrubs should be allowed to grow only on adjacent berms. If roots penetrate levees, fill materials should be added to levee landside slopes in order to construct a partial setback levee and increase stability.
3. Widen streams downstream of removed water diversion structure to increase conveyance

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- capacity.
4. Incorporate flood control criteria into the design of stream bank revegetation projects. For example, by increasing the width of vegetated sections to maintain conveyance capacity, the net effect of vegetation on flood control would be negligible.
 5. Identify locations susceptible to seepage-induced failure on Delta islands that may be intentionally flooded for habitat.
 6. Implement a seepage monitoring program on nonflooded islands adjacent to potential shallow-flooded islands.
 7. Develop seepage control performance standards to be used during island flooding and storage periods to determine net seepage caused by shallow flooding.
 8. Improve levees to withstand expected hydraulic stresses and seepage.
 9. Design erosion protection measures to minimize or eliminate wave splash and run-up erosion.
 10. Use rip rap or another suitable means of slope protection to dissipate wave force.
 11. Construct large wind/wave breaks in the flooded islands to reduce wind-fetch and erosion potential.
 12. Identify existing or planned wells that could affect groundwater and substrate conditions underlying nearby levees or flood control devices.
 13. Provide incentives to terminate use of wells that can adversely affect levee stability, reduce their pumping volume to safe withdrawal levels as they affect substrate stability, or otherwise replace them with sources that could not affect levee stability.
 14. Design structures to minimize the loss of channel conveyance at gate structures located in channels.
 15. Install relief wells near the toes of existing levees on neighboring lands.
 16. Construct toe berms with an internal drainage system on neighboring lands.
 17. Lower the pool elevation on the storage islands.
 18. Develop wetland easements adjacent to levees on neighboring islands.
 19. Construct a combination of seep and interior ditches and increase pumping rates, install clay blankets, and install impervious cutoff walls through storage island levees.
 20. Control boat traffic in order to reduce boat wakes to levels that will not cause levee or bank erosion.
 21. Coordinate erosion protection measures and wave force dissipation measures with the Ecosystem Restoration Program to minimize adverse effects to revegetation efforts.
 22. Implement flood management measures including dredging, levee maintenance, and snag removal.
 23. Support local groundwater management that reduces overdraft and third-party effects, including reduction or discontinuation of groundwater pumping..
 24. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.

7.11 Cultural Resources. Implementation of the Preferred Program Alternative may have potentially significant effects on cultural resources. These effects may include: (1) Effects on cultural resources from construction, excavation, fill and flooding; and (2) Alteration of the

historic setting of a cultural resource.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on cultural resources:

1. Conduct cultural resource inventories.
2. Avoid sites through project redesign.
3. Map sites prior to undertaking actions that affect cultural resources.
4. Conduct surface collections.
5. Perform test excavations.
6. Probe for potentially buried sites.
7. Prepare reports to document mitigation work.
8. Conduct full-scale excavation of sites slated for destruction as a result of projects.
9. Prepare public interpretive documents.
10. Document historic structures by preparing Historic Engineering Records or Historic American Building Surveys.
11. Conduct ethnographic studies for traditional cultural properties.

7.12 Public Health and Environmental Hazards. Implementation of the Preferred Program Alternative may have potentially significant effects on public health and environmental hazards. These effects may include: (1) Short- and long-term increases in mosquito breeding habitat from wetland restoration activities and fluctuating water levels; (2) Increased risk of groundwater and surface water contamination from naturally occurring or spilled hazardous materials and from improper handling of hazardous materials; (3) Increased exposure to hazardous materials and waste from construction activities related to storage and conveyance projects and other Program elements; (4) Increases in water quality degradation, resuspension of contaminants, and exposure to hazardous materials from dredging activities; and (5) Increases in levels of methyl mercury released into the Bay-Delta ecosystem from wetland restoration, levee rehabilitation activities and conveyance actions.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on public health and environmental hazards:

1. Use various mosquito control methods, such as biological agents, chemical agents, and ecological manipulation of mosquito breeding habitat.
2. Support actions to establish or find funding for mosquito abatement activities.
3. Remove or disturb water that remains stagnant for more than 3 days at a construction site.
4. Limit construction to cool weather, when mosquito production is lowest.
5. Limit construction to periods of low precipitation to avoid pools of standing water.
6. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
7. Increase monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.
8. Limit or coordinate construction activities to favorable weather conditions to forestall dispersing hazardous materials.

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9. Conduct core sampling and analysis of proposed dredge areas and engineer solutions to avoid or prevent environmental exposure to toxic substances after dredging.
 10. Modify engineering plans to minimize mercury related problems.
 11. Cap exposed toxic sediments with clean clay/silt and protective gravel.
 12. Locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.
 13. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
 14. Use sediment curtains to contain turbidity plumes during dredging

7.13 Visual Resources. Implementation of the Preferred Program Alternative may have potentially significant effects on visual resources. These effects may include: (1) Long-term visual effects of new facilities or modified existing facilities; (2) Effects in visually sensitive areas from restoration actions; (3) Degraded watershed views from such actions as erosion control and fire management practices; (4) Creation of borrow pits or spoils material disposal sites associated with storage, conveyance, levee projects, and other Program actions; and (5) Long-term visual effects from construction activities extending more than 5 years.

The following mitigation measures will reduce potential effects of implementation of the Preferred Program Alternative on visual resources:

1. Time changes in flow regimes to minimize “bathtub ring” effects during times of peak recreation use.
2. Minimize construction activities during the peak-use recreation season.
3. Avoid unnecessary ground disturbance outside the necessary construction area.
4. Water areas where dust is generated, particularly along unpaved haul routes and during earth-moving activities, to reduce visual effects caused by dust.
5. Locate and direct exterior lighting for construction activities so that it is concealed to the extent practicable when viewed from local roads, nearby communities, and any recreation areas.
6. Site proposed reservoir(s), if possible, to minimize required cut and fill and locate the reservoir on the flattest topographic section of the site to minimize its visibility.
7. Construct facilities with earth-tone building materials or other visually aesthetic design materials.
8. Revegetate disturbed areas as soon as possible after construction.
9. Locate visually obtrusive features, such as burrow pits and dredged material disposal sites, outside visually sensitive areas and observation sites.
10. Select vegetation type, placement, and density to be compatible with patterns of existing vegetation where revegetation occurs in natural areas. Vegetation such as emergent marsh grasses that can tolerate periodic flooding and drying may be useful.
11. Install landscape screening, such as grouped plantings of trees and tall shrubs, to screen proposed facilities from nearby sensitive viewers.
12. Use native trees, bushes, shrubs, and ground-cover for landscaping, when appropriate, at facilities such as dams and pumping-generating plants, and along new and expanded canals

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- and conveyance channels, in a manner that does not compromise facility safety and access.
 13. Create view opportunities of outstanding features through selective vegetation reduction or constructing roadside viewing areas.
 14. Recontour and add vegetation to areas rated as “poor” in variety class.

APPENDIX B

Mitigation Measures Not Adopted in the Record of Decision

Appendix B

Mitigation Measures Not Adopted in the Record of Decision

The following mitigation measures recommended in comments on the Programmatic EIS/EIR are either (1) not adopted because they inappropriate, or (2) rejected as not practicable due to specific economic, technological, or other considerations. The measures are grouped by section from the impact analysis chapters of the Final Programmatic EIS/EIR. Parenthetical references are to the Response to Comments Volume III document appended to the Final Programmatic EIS/EIR.

5.2 Hydrodynamics and Hydraulics

- Provide mitigation strategies aimed at reducing significant impacts to Bay-Delta hydrodynamics and riverine hydraulics (e.g., unacceptable velocity increases) in Section 5.2. (1217-21)

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. Mitigation strategies are not included in Section 5.2 because the section deals only with hydrodynamic and hydraulic modeling. However, the environmental effects resulting from hydrodynamic and hydraulic changes are addressed in other sections of the Final Programmatic EIS/EIR in the context of each of the resources affected. For example, effects on water quality, soils, fisheries and aquatic ecosystems, and flood control and appropriate mitigation strategies are addressed in Sections 5.3, 5.5, 6.1, and 7.8, respectively.

5.3 Water Quality

- Implement source control and offset increasing loads to treatment plants due to water transfers and water conservation as a measure to reduce total dissolved solids (TDS). (1226-D-8)
- Include mitigation strategies for the potential increase in BOC, bacteria, and pathogens from the Ecosystem Restoration Program. (1217-30)

These mitigation measures were not adopted because they are similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. To the extent Program actions would result in increases of constituents of concern such as TDS, TOC and pathogens, mitigation strategies in Section 5.3, including treating wastewater at the source, upgrading water treatment processes, and applying agricultural and urban BMPs, will reduce these effects.

- Mitigate the selenium impacts of refineries and municipalities in the North Bay area by assisting with financing a drainage facility for San Joaquin Valley selenium loads. (1349-49)

This mitigation measure was not adopted because it addresses an environmental effect not caused by the CALFED Program. Selenium impacts are not caused by the CALFED Program. This comment addresses existing selenium impacts of refineries and municipal treatment facilities, not CALFED actions. However, CALFED includes actions such as agricultural land retirement in the western San Joaquin Valley to reduce the adverse effects of selenium in order to reach its primary objectives for water quality and ecosystem quality.

- Include mitigation measures to address bromide reduction to the State Water Project, such as real time operational flexibility of the export pumps as a means for reducing export of bromide and salinity. (1230-A-8)

This mitigation measure was not adopted because it addresses an environmental effect not caused by the CALFED Program. Bromide is an existing constituent of concern which enters the Delta through the intrusion of seawater through the Bay, not as a result of CALFED Program actions. However, CALFED includes actions such as real-time management of the export pumps to meet water quality objectives.

5.7 Transportation

- Require future EIRs and EISs for project-specific actions to include traffic assessments and analysis of traffic associated with increases in recreational opportunities resulting from new reservoirs, and other land conversions to recreational uses. (1217-32)

This mitigation measure was not adopted because it is ineffective in mitigating adverse environmental effects. All CALFED project specific actions will comply with the requirements of NEPA and CEQA. Traffic analyses do not mitigate transportation impacts, but they may be used to identify the need for site-specific mitigation measures. To the extent appropriate, traffic analyses may be required for certain project specific actions. However, not every action that increases recreational uses will require traffic analyses, making it inappropriate to adopt this mitigation measure at the programmatic level.

5.8 Air Quality

- Work with local and regional planning jurisdictions to identify areas subject to agricultural land conversion for advance planning for air quality impacts. (1217-33)

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. Mitigation strategies 4, 11, and 21 on page 7.1-2 in the Final Programmatic EIS/EIR address this suggestion.

6.2 Vegetation and Wildlife

- The mitigation strategies should discuss need for additional action at the site specific level if program actions disturb special-status species or protected habitats.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. This recommendation is addressed by the adopted Mitigation Monitoring Plan discussed in Chapter 9 of the Final Programmatic EIS/EIR and in this ROD. CALFED will monitor all mitigation measures through the Science Program.

7.1 Agricultural Land and Water Use

- Meet Program goals by maintaining land in private ownership, rather than through government purchase.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. Mitigation strategies 9, 10, and 14 on page 7.1-2 in the Final Programmatic EIS/EIR address this suggestion. (IA7.1.11-15)

- Work with local landowners and organizations in planning and developing projects.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. Mitigation strategies 4, 11, and 21 on page 7.1-2 in the Final Programmatic EIS/EIR address this suggestion. (IA7.1.11-15)

- Maintain the productivity and flexibility of agricultural lands to the greatest extent practicable when implementing the entire Program.

This suggestion is too general to be an effective mitigation measure as defined by CEQA. However, several mitigation strategies in Section 7.1.11, such as “Restoring existing degraded habitat as a priority before converting agricultural land,” would assist in serving this purpose. (IA7.1.11-15) Therefore, this mitigation measure was not adopted.

- Require buffers when developing habitat projects adjacent to agricultural uses.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. This recommendation is addressed by mitigation strategy 19 on page 7.1-3 in the Final Programmatic EIS/EIR. Specifics on buffer design must be developed at the site-specific level. (IA7.1.11-16)

- Establish an easement or transfer of development rights program.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. Further, the State of California already has developed such a program, the California Farmland Conservancy Program that is administered by the Department of Conservation. This is addressed in mitigation strategy 8 on page 7.1-2 in the Final Programmatic EIS/EIR. (IA7.1.11-16)

- Phase implementation of specific Program components.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. This is addressed by mitigation strategy 17 in Section 7.1.11. This strategy would allow implementation to proceed as needed, rather than happening all at once. (IA7.1.11-16)

- Establish an agricultural mitigation oversight entity to oversee implementation of mitigation by CALFED.

This mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted in this ROD. This recommendation is addressed by the adopted Mitigation Monitoring Plan discussed in Chapter 9 of the Final Programmatic EIS/EIR and this ROD. (IA7.1.11-15) CALFED will monitor all mitigation measures through the Comprehensive Monitoring, Assessment and Research Program.

- Implement a Planned Unit Development approach to habitat development.

This mitigation measure was not adopted because it is ineffective in mitigating adverse environmental effects. Planned Unit Developments are urban planning designations that allow large tracts of housing or commercial development to set their own development standards outside normal zoning ordinances. The comment provides insufficient information to evaluate how Planned Unit Developments could apply as a mitigation strategy. (IA7.1.11-16)

- Require comprehensive environmental evaluation for projects that will adversely affect agricultural lands, using the NRCS Land Evaluation and Site Assessment (LESA) system.

All CALFED project specific actions will comply with the requirements of NEPA and CEQA. LESA may be used by federal agencies, as appropriate for the scale of project, and can optionally be used by state agencies. LESA is designed to gauge the impacts of urban-type development and may be inappropriate for evaluation of other project specific actions. Therefore, the full or partial use of LESA may or may not be used at the project specific level but is not appropriate at the programmatic level. (IA7.1.11-15)

- Provide development agreements to support remaining agricultural lands when a project results in agricultural land conversion.

It is unclear what type of impact this measure would mitigate. It appears to be a separate

agreement to carry out mitigation measures at the site-specific level. Site-specific mitigation measures will be included in second-tier environmental documents, as appropriate, with the required measures, such as conditions of approval, to monitor such mitigation. It is unclear what purpose would be served by a second document memorializing these mitigations. (IA7.1.11-16)

- Develop specific mitigation measures for the Ecosystem Restoration Program.

This measure is too project-specific for a programmatic document. In developing project specific mitigation measures for project specific Ecosystem Restoration Program actions, CALFED agencies will continue to consider any appropriate measures that help avoid or reduce environmental effects. Because the Ecosystem Restoration Program Plan does not provide project specific information, more detailed mitigation measures for potential effects of project specific actions cannot be determined at this time. The EIS/EIR contains a large number of mitigation strategies for agricultural effects, which must be used by individual project lead agencies in determining mitigation measures for project specific actions. Section 7.1.11 includes 27 mitigation strategies for effects due to agricultural land conversion and local planning impacts; Sections 7.2 and 7.3 include an additional 19 mitigation strategies to reduce adverse agricultural economic and social effects. (IA7.1.11-21)

- Purchase flood easements and repair existing levees rather than developing setback levees.

Decisions on how best to increase flood protection for lands behind specific levees have not yet been made. The Long-Term Levee Protection Plan includes levee strengthening and setback levees as options. (IA7.1.11-16) The merits and liabilities of setting back levees will be closely scrutinized, and the use of setback levees may not be feasible or desirable in many cases. Landowners and other stakeholders will be consulted during project formulation. (LS-4.2-2.) At a programmatic level, the option to use setback levees is included in order to allow flexibility to achieve the primary objectives of ecosystem quality and levee system integrity, depending on the characteristics of the various second-tier levee projects.

- Direct habitat development to poorer quality agricultural soils.

Several mitigation strategies in Section 7.1.11, such as “restore existing degraded habitat as a priority before converting agricultural land,” “focus restoration efforts on public lands before converting agricultural land,” “focus restoration efforts on acquiring lands from willing sellers where part of the reason to sell is economic hardship,” and “use farmer-initiated and developed restoration projects,” would assist in serving this purpose. However, since the various habitat types have specific soils requirements, as do agricultural crops, this measure will not be appropriate for every habitat restoration action. While this measure will be considered for project specific actions, it is not appropriate to adopt this mitigation measure at the programmatic level.

- Reaffirm the state’s right-to-farm policy.

The right-to-farm statute was designed to prevent impacts on agriculture from encroaching

urbanization and generally does not apply to the CALFED Program actions. In addition, reaffirming an existing statute is not a mitigation measure. (IA7.1.11-15)

- Before implementing any action requiring additional water, develop the water source; if water is from former agricultural use, mitigate the significant environmental impact.

CALFED agencies will, by necessity, need to identify and purchase water for projects before that water is applied. That is not a mitigation measure but a practical reality given California's water rights laws. (IA7.1.11-15) Section 7.1 of the Final Programmatic EIS/EIR describes the existing environment as it pertains to agriculture. The environmental effects resulting from a change in water use are addressed in other sections of the Final Programmatic EIS/EIR in the context of each of the resources affected. For example, changes in water use leading to loss of agricultural land or impacts to groundwater levels, water quality or water supply are addressed in Sections 7.1, 5.4, 5.3 and 5.1, respectively. Loss or conversion of agricultural land is considered a significant and unavoidable impact of the Program even though all practicable mitigation measures were adopted to reduce this impact. Economic and social effects of water transfers and other Program actions and ways to reduce these effects are discussed in Sections 7.2 and 7.3, respectively.

- Develop an Agricultural Water Account to mitigate for agricultural water directed to CALFED uses.

While the CALFED Program does not include an Agricultural Water Account, the water supply reliability actions as outlined in Sections 2.2.4 and 2.2.5 of the ROD are intended to provide greater certainty of water supplies for agricultural and other users.

- Pay fair market values.

Payment of fair market values is incorporated as a standard Program policy to minimize economic effects. (See Page 7.2-23.) (IA7.1.11-19)

- Scheduling construction activities to allow harvests.

Scheduling construction activities to allow harvests is incorporated as a standard Program policy to minimize economic effects. (See Page 7.2-23.) (IA7.1.11-19)

- Establish Agricultural Exclusive zoning.

Establishing zoning is a local responsibility. CALFED has no authority to establish local zoning, even in conjunction with the Delta Protection Commission. (IA7.1.11-16) This mitigation measure is therefore not adopted for legal considerations.

- Increase subvention funding and property tax sharing and develop legislation for rural development zones.

Increased subvention funding and property tax sharing, and legislation for rural development zones are outside the abilities of the Program's lead agencies to implement. (IA7.1.11-19) These suggestions are more appropriately directed to the Legislature. This mitigation measure is therefore rejected for legal considerations.

- When conversion occurs, remove Class I and II soils from the habitat site to other agricultural locations.

This measure could hamper ecosystem restoration progress because habitat types have soil requirements similar to agricultural crops. For instance, valley oak woodlands would not grow on hard, poorly drained soils. The costs of moving vast amounts of soils may not be justified by the gains from the receiving parcels and could limit the ability to restore the land to agricultural purposes in the future. Further, additional regulatory hurdles, such as triggering the Surface Mining and Reclamation Act, could make this mitigation even less economically feasible. (IA7.1.11-18) This mitigation measure is therefore not adopted. for economic, legal and technological considerations and because it could cause new adverse environmental effects.

- Require 1 acre of farmland to be protected for every acre converted.

Protection of off-site lands to mitigate conversions of farmlands is addressed in mitigation strategy 8 of Section 7.1. However, the exact amounts to be protected would depend on the project specific effects of conversion, as measured in the second-tier environmental document. The feasibility of this mitigation strategy would also need to be evaluated at the project-specific level, and would depend on the number of voluntary participants in the easement program and the cost of acquiring the easements. (IA7.1.11-18). At a programmatic level, the feasibility of this measure is too uncertain. This mitigation measure is therefore not adopted for technical and economic considerations.

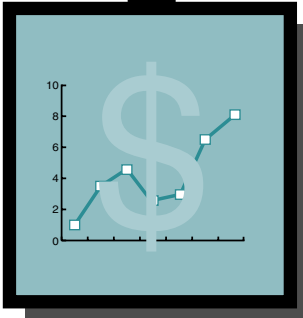
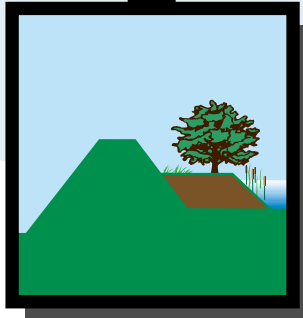
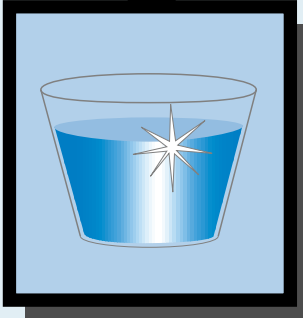
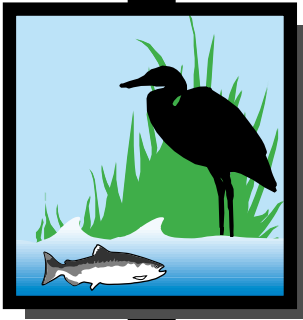
- Adopt a no-net-loss policy for agricultural land.

Because the Program will require agricultural lands in the Delta and elsewhere for Program purposes, a no-net-loss policy as suggested would require at least a 1:1 replacement as mitigation for any agricultural lands converted to Program purposes. This proposed mitigation is not practicable and is therefore not adopted. The cost of purchasing and providing land, irrigation infrastructure, and water as mitigation for agricultural land loss—which direct replacement would require—would make almost any project that is converting agricultural lands infeasible, whether for habitat or urban uses. In addition, irrigation of new lands can cause its own series of environmental effects. Section 7.1.12 describes farmland conversions caused by the Program as a potentially significant environmental effect at the programmatic level. (IA7.1.7-10) The Program objectives to improve and increase terrestrial habitats in order to support sustainable populations of diverse and valuable plant and animal species in the Bay-Delta cannot be achieved without some creation of habitat on land currently used for agriculture. (IA7.1.11-11)

7.12 Public Health

- CALFED must include mitigation to assure that urban water agencies can cost-effectively treat water from the Delta for public health protection since there are no definite plans to construct an isolated facility. (1230-A-3)

This mitigation measure was not adopted because it addresses an environmental impact not caused by the CALFED Program. CALFED actions will not reduce the quality of drinking water nor increase the cost of drinking water treatment. However, CALFED includes source control, water treatment facility improvements and other actions to protect public health.



CALFED
BAY-DELTA
PROGRAM

Attachment 1

California Environmental Quality Act Requirements

August 28, 2000

CALIFORNIA ENVIRONMENTAL QUALITY ACT REQUIREMENTS

CEQA FINDINGS OF FACT

- I. Introduction
- II. Project Description
- III. Programmatic EIR
- IV. Administrative Record
- V. Mitigation Monitoring Plan
- VI. Findings on Specific Impacts and Mitigation Measures
- VII. Cumulative Impacts
- VIII. Growth-inducing Impacts
- IX. Feasibility of Potential Project Alternatives

STATEMENT OF OVERRIDING CONSIDERATIONS

CERTIFICATION BY THE SECRETARY, CALIFORNIA RESOURCES AGENCY

I. INTRODUCTION

The State and Federal CALFED Agencies prepared a joint programmatic environmental impact study/environmental impact report to analyze the impacts of approving the CALFED Bay-Delta Program. As a joint document, it was prepared in compliance with both the California Environmental Quality Act (“CEQA”) and the National Environmental Policy Act (“NEPA”). The California Resources Agency is the State lead agency pursuant to CEQA.

CEQA states that a project shall not be approved if it would result in a significant environmental impact, or if feasible mitigation measures or feasible alternatives can avoid or substantially lessen the impact. Only when there are specific economic, social, or other considerations which make it infeasible to substantially lessen or avoid an impact can a project with significant impacts be approved. Pub. Resources Code Section 21000, *et seq.*

These findings, adopted by the Secretary for Resources of the California Resources Agency (“Secretary”), describe the potentially significant environmental impacts analyzed in the CALFED Bay-Delta Final Programmatic EIS/EIR (Programmatic EIS/EIR or EIS/EIR) and make one or more of the following findings for each of the potentially significant environmental impacts identified in the EIS/EIR.

1. Changes or alternatives which avoid or substantially lessen the significant environmental effects as identified in the Final Programmatic EIS/EIR have been required or incorporated into the project, or
2. Such changes or alternatives are within the responsibility and jurisdiction of another public agency. Such changes have been adopted by such other agency or can and should be adopted by such other agency, or
3. Specific economic, social or other considerations make infeasible the mitigation measures or project alternatives identified in the EIS/EIR.

In addition, these findings include the project description, an explanation of the programmatic nature of this EIS/EIR, a discussion of the cumulative and growth-inducing impacts, the mitigation monitoring plan, and a statement of overriding considerations, each of which is adopted by the Secretary.

II. PROJECT DESCRIPTION

To understand the nature of the project for purposes of CEQA, it is important to bear in mind the genesis and purpose of the CALFED Bay-Delta Program (“Program” or “CALFED Program”). The San Francisco Bay/Sacramento-San Joaquin Delta estuary (Bay-Delta) is the largest estuary on the West Coast and is a major source of habitat for a wide range of wildlife and fisheries. It is also the source of drinking water and irrigation water for California’s two largest water distribution systems, the federal Central Valley Project (CVP) and California’s State Water Project (SWP), as well as other smaller water diverters. These diversions, along with increased population pressures throughout California, the presence of introduced species, water pollution, and numerous other factors have had a serious impact on the fish and wildlife resources in the Bay-Delta estuary, which in turn have led to restrictions on water operations and exports pursuant to the State and Federal Endangered Species Acts.

Disagreement on how to manage these competing demands and protect the Bay-Delta resources have increasingly taken the form of protracted litigation and legislative battles; as a result, progress on virtually all water-related issues has become mired, approaching gridlock. The CALFED Program was established to reduce conflicts in the system and provide a solution that competing interests could support by solving problems in ecosystem quality, water quality, water supply reliability, and levee and channel integrity. The Program seeks to do this by developing a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. This plan is set forth in the EIS/EIR. Thus, the approval of the long-term, multi-stage plan which is the CALFED Program, including the eight program elements designed to achieve its four primary objectives concurrently, is the project for purposes of the Programmatic EIS/EIR.

The Program includes broad approaches to guide the formulation of project-specific actions that may be implemented in the future, with additional environmental documentation and project permit details to be considered as the individual projects included within the scope of the Program are proposed and considered for approval. Neither the project description nor the EIS/EIR include detailed descriptions of these actions, and this EIS/EIR is not intended to be used to authorize these project-specific actions.

CALFED’s Objectives and Solution Principles. To determine the best way to fulfill its mission, CALFED undertook to address the problems of the Bay-Delta system concurrently and comprehensively within each of four resource categories: ecosystem quality, water quality, water supply reliability, and levee system integrity. CALFED’s primary objectives, developed as part of the early planning process with stakeholders and affected agencies, are identified below.

- **Ecosystem Quality.** Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- **Water Supply.** Reduce the mismatch between Bay-Delta water supplies and the current and projected beneficial uses dependent on the Bay-Delta system.
- **Water Quality.** Provide good water quality for all beneficial uses.
- **Vulnerability of Delta Functions.** Reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees.

The problems and possible solutions in each of these categories are linked physically, ecologically, and socioeconomically. In the past, most efforts to improve water supply reliability or water quality, improve ecosystem health, or maintain and improve Delta levees focused on a single resource category. A project that focuses on a single problem within the Delta may be more manageable but is likely to have only limited success. Projects designed to solve a problem within one resource category often do so by expending or harming resources in other resource categories. For example, projects to improve water supply reliability may degrade ecosystem health and vice versa. The solution to a problem in one resource category may thus exacerbate problems in others. When this happens, conflicts regarding the use and management of resources within the Delta are not reduced and may actually be intensified. Consequently, independent, narrowly focused projects have been ineffective in addressing conflicts in the Delta.

The CALFED Program took a broader approach. To acknowledge clearly that the problems in the four resource categories within the Bay-Delta system are interrelated and should be addressed concurrently and comprehensively, CALFED developed six solution principles in consultation with cooperating agencies, stakeholders, and interested public members. The solution principles are identified below.

- **Reduce Conflicts in the System.** Solutions will reduce major conflicts among beneficial uses of water.
- **Be Equitable.** Solutions will focus on solving problems in all problem areas. Improvement for some problems will not be made without corresponding improvements for other problems.
- **Be Affordable.** Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.

- **Be Durable.** Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.
- **Be Implementable.** Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.
- **Pose No Significant Redirected Impacts.** Solutions will not solve problems in the Bay-Delta system by redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

The CALFED mission, the primary objectives, and these solution principles were used to measure the overall acceptability of alternatives for detailed consideration in the EIS/EIR. The Program considered, combined and refined over 100 preliminary alternative approaches. Eventually, the CALFED Agencies selected four alternatives together with the No Action Alternative to evaluate in the EIS/EIR. The alternatives selection process is more fully described in Common Response 5 of Volume I, Response to Comments Technical Appendix, and in Section IX of these CEQA Findings.

No long term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to efforts, or foresee events such as earthquakes, climate change, or the introduction of new species to the system. Adaptive management acknowledges the need to adapt actions as conditions change and as the agencies learn more about the system and how it responds. In essence, adaptive management calls for designing and monitoring actions such that they improve the understanding of the system while at the same time improving the system itself. Adaptive management is an essential part of implementing every CALFED Program element.

The Preferred Program Alternative meets these objectives and the solution principles, and carries out the project in a manner that includes the ability to apply adaptive management principles within the framework of the plan, over the 25-30 year planning period.

Preferred Program Alternative

The Preferred Program Alternative consists of a set of broadly described programmatic actions which set the long-term, overall direction of the 30-year CALFED Program. The description is programmatic in nature, intended to help agencies and the public make decisions on broad methods to meet program purposes. The Preferred Program Alternative is made up of the Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program, Water Use Efficiency Program, Water Transfer Program, Watershed Program, Storage and Conveyance.

Actions described are intended to take place in an integrated framework and not independently of one another. While each program element is described individually, it is understood that only through coordinated, linked, incremental investigation, analysis and implementation can we effectively resolve problems in the Bay-Delta system.

Levee System Integrity Program. The focus of the Levee System Integrity Program is to improve levee stability to benefit all users of Delta water and land. Actions described in this program element protect water supply reliability by maintaining levee and channel integrity. Levee actions will be designed to provide simultaneous improvement in habitat quality (consistent with the Ecosystem Restoration Program goals), which will indirectly improve water supply reliability. Levee actions also protect water quality, particularly during low flow conditions when a catastrophic levee breach would draw salt water into the Delta.

There are five main parts to the levee program plus Suisun Marsh levee rehabilitation work:

- C Delta Levee Base Level Protection Plan - Improve and maintain existing Delta levee system stability to meet the Army Corps of Engineers PL 84-99 levee standard.
- C Delta Levee Special Improvement Projects - Enhance flood protection for key islands that provide statewide benefits to the ecosystem, water supply, water quality, economics, infrastructure, etc.
- C Delta Levee Subsidence Control Plan - Implement current best management practices (BMPs) to correct subsidence adjacent to levees and coordinate research to quantify the effects and extent of inner-island subsidence.
- C Delta Levee Emergency Management and Response Plan - The emergency management and response plan will build on existing State, Federal, and local agency emergency management programs.
- C Delta Levee Risk Assessment - Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluate the consequences, and develop recommendations to manage the risk.
- C Suisun Marsh Levees - Evaluate, and where appropriate, rehabilitate Suisun Marsh levees.

Water Quality Program. The CALFED Program is committed to achieving continuous improvement in the quality of the waters of the Bay-Delta System with the goal of minimizing ecological, drinking water and other water quality problems. Improvements in water quality will result in improved ecosystem health, with indirect improvements in water supply reliability. Improvements in water quality also increase the utility of water, making it suitable for more uses and reuses.

The Water Quality Program includes the following actions:

- C Drinking water parameters - Reduce the loads and/or impacts of bromide, total organic carbon (TOC), pathogens, nutrients, salinity, and turbidity through a combination of measures that include source reduction, alternative sources of water, treatment, storage and if necessary, conveyance improvements such as a screened diversion structure (up to 4000 cfs) on the Sacramento River between Hood and Georgiana Slough. The Conveyance section of this document includes a discussion of this potential improvement.
- C Pesticides - Reduce the impacts of pesticides through (1) development and implementation of BMPs, for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education and assistance in implementation of control strategies for the regulated pesticide users.
- C Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs.
- C Trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs.
- C Mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
- C Selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs.
- C Salinity - Reduce salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies, and facilitate development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- C Turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay Delta and its tributaries.
- C Low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.

- C Toxicity of unknown origin - Through research and monitoring, identify parameters of concern in the water and sediment and implement actions to reduce their impacts to aquatic resources.

Ecosystem Restoration Program. The goal of the Ecosystem Restoration Program is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. In addition, the Ecosystem Restoration Program, along with the water management strategy, is designed to achieve or contribute to the recovery of listed species found in the Bay-Delta and, thus, achieve goals of the Multi-Species Conservation Strategy (MSCS). Improvements in ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions.

The Ecosystem Restoration Program identifies programmatic actions designed to restore, rehabilitate, or maintain important ecological processes, habitats, and species within 14 ecological management zones. Implementation of these programmatic actions will be guided by six goals presented in the Strategic Plan for Ecosystem Restoration. Nearly 100 restoration objectives have been developed which are directly linked to one of the six goals. Each objective further defines the restoration approach for each ecological process, habitat, species or ecosystem stressor. One to several restoration targets have been developed for each objective to set more specific or quantified restoration levels.

Long-term implementation of the Ecosystem Restoration Program will be guided by the adaptive management approach described in the Strategic Plan for Ecosystem Restoration. This approach to restoration will require review by an ecosystem restoration science review panel and will rely on information developed in the Science Program.

Representative Ecosystem Restoration Program actions include:

- C Protecting, restoring, and managing diverse habitat types representative of the Bay-Delta and its watershed.
- C Acquiring water from sources throughout the Bay-Delta's watershed to provide flows and habitat conditions for fishery protection and recovery.
- C Restoring critical in-stream and channel-forming flows in Bay-Delta tributaries.
- C Improving Delta outflow during key periods.
- C Reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of easements, and the construction and management of flood bypasses for both habitat restoration and flood protection.
- C Developing assessment, prevention and control programs for invasive species.
- C Restoring aspects of the sediment regime by relocating in-stream and floodplain gravel mining,

- and by artificially introducing gravels to compensate for sediment trapped by dams.
- C Modifying or eliminating fish passage barriers, including the removal of dams, construction of fish ladders, and construction of fish screens that use the best available technology.
- C Targeting research to provide information that is needed to define problems sufficiently, and to design and prioritize restoration actions.

Water Use Efficiency Program. The Water Use Efficiency Program includes actions to assure efficient use of existing and any new water supplies developed by the Program. Efficiency actions can alter the pattern of water diversions and reduce the magnitude of diversions, providing ecosystem benefits. Efficiency actions can also result in reduced discharge of effluent or drainage, improving water quality.

The Water Use Efficiency Program will build on the work of the existing Agricultural Water Management Council process and the California Urban Water Conservation Council process, supporting and supplementing those processes through planning and technical assistance and through targeted financial incentives (both loans and grants). The Water Use Efficiency Program has identified potential recovery of currently irrecoverable water losses of over 1.4 million acre-feet of water annually by 2020 as a result of CALFED actions. Early in Stage 1, CALFED will identify measurable goals and objectives for its urban and agricultural water conservation program, water reclamation programs and managed wetlands programs.

Water conservation-related actions include:

- C Implement agricultural and urban conservation incentives programs to provide grant funding for water management projects that will provide multiple benefits which are cost-effective at the state-wide level, including improved water quality and reduced ecosystem impacts.
- C Identify, in region-specific strategic plans for agricultural areas, measurable objectives to assure improvements in water management.
- C Expand State and Federal programs to provide increased levels of planning and technical assistance to local water suppliers.
- C Work with the Agricultural Water Management Council (AWMC) to identify appropriate agricultural water conservation measures, set appropriate levels of effort, and certify or endorse water suppliers that are implementing locally cost-effective feasible measures.
- C Work with the California Urban Water Conservation Council (CUWCC) to establish an urban water conservation BMP certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures.
- C Help urban water suppliers comply with the Urban Water Management Planning Act.
- C Identify and implement practices to improve water management for wildlife areas.

- C Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
- C Conduct directed studies and research to improve understanding of conservation actions.

Water recycling actions include:

- C Help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- C Expand State and Federal recycling programs to provide increased levels of planning, technical, and financing assistance (both loans and grants) and to develop new ways of providing assistance in the most effective manner.
- C Provide regional planning assistance that can increase opportunities for the use of recycled water.

Water Transfer Program. The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a state-wide water transfer market. The framework also includes mechanisms to help provide protection from third party impacts. A transfers market can improve water availability for all types of uses, including the environment. Transfers can also help to match water demand with water sources of the appropriate quality, thus increasing the utility of water supplies.

The Water Transfer Program will include the following actions and recommendations:

- C Establish a California Water Transfer Information Clearinghouse to provide a public informational role. The clearinghouse would 1) ensure that information regarding proposed transfers is publicly disclosed and, 2) perform on-going research and data collection functions to improve the understanding of water transfers and their potential beneficial and adverse effects.
- C Require water transfer proposals submitted to the DWR, Reclamation, or the State Water Resources Control Board to include analysis of potential groundwater, socio-economic, or cumulative impacts as warranted by individual transfers.
- C Streamline the water transfer approval processes currently used by DWR, Reclamation, and the State Water Resources Control Board. This would include clarifying and disclosing current approval procedures and underlying policies as well as improving the communication between transfer proponents, reviewing agencies, and other potentially affected parties.
- C Refine quantification guidelines used by water transfer approving agencies when they are reviewing a proposed water transfer. This will include resolving issues between stakeholders

and approving agencies regarding the application of current agency-based quantification criteria.

- C Improve the accessibility of State and Federal conveyance and storage facilities for the transport of approved water transfers.
- C Clearly define carriage water requirements and resolve conflicts over reservoir refill criteria such that transfer proponents have a clear understanding of the implications of these requirements.
- C Identify appropriate assistance for groundwater protection programs through interaction with CALFED Agencies, stakeholders, the Legislature and local agencies. This is intended to assist local agencies in the development and implementation of groundwater management programs that will protect groundwater basins in water transfer source areas.
- C Establish new accounting, tracking, and monitoring methods to aid instream flow transfers under California Water Code Section 1707.

Watershed Program. The goal of the CALFED Watershed Program is to promote locally led watershed management activities and protections that contribute to the achievement of CALFED goals for ecosystem restoration, water quality improvement, and water supply reliability. The Watershed Program will accomplish these tasks by providing financial and technical assistance to local community watershed programs.

The Watershed Program includes the following elements:

- C Build local community capacity to assess and manage watersheds affecting the Bay-Delta system.
- C Develop local watershed assessment and management plans.
- C Fund development and implementation of specific watershed conservation, maintenance, and restoration actions identified in these plans.
- C Facilitate and improve coordination and assistance among government agencies and local watershed organizations.
- C Develop watershed program performance measures and monitoring protocols consistent with the CALFED Science Program.
- C Support resource conservation education at the local watershed level, and provide organizational and administrative support to watershed programs.
- C Identify the watershed functions and processes that are relevant to CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.

Storage. Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

Decisions to construct groundwater or surface water storage will be predicated on compliance with all environmental review and permitting requirements, and maintaining balanced implementation of all CALFED Program elements. Subject to these conditions, new groundwater and surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling, an improved water transfer market, and habitat restoration, as appropriate to meet CALFED Program goals. During Stage 1, through the water management strategy (including the Integrated Storage Investigation), CALFED will continue to evaluate surface water and groundwater storage, identify acceptable project-specific locations, and initiate permitting, NEPA and CEQA documentation, and construction if all conditions are satisfied.

The total volume of new or expanded surface water and groundwater storage evaluated in the EIS/EIR ranges up to 6 million acre feet, and surface storage facility locations being considered are located in the Sacramento and San Joaquin Valley and in the Delta. Those surface storage sites that will be pursued in Stage 1 are discussed in Section 2.2.5. New groundwater programs could be implemented statewide.

Conveyance. The Preferred Program Alternative employs a through-Delta approach to conveyance. Modifications in Delta conveyance will result in improved water supply reliability, protection and improvement of Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees. The Preferred Program Alternative through-Delta conveyance facility actions include:

- C Construction of a new screened intake at Clifton Court Forebay with protective screening criteria.
- C Construction of either a new screened diversion at Tracy with protective screening criteria; and/or an expansion of the new diversion at Clifton Court Forebay to meet the Tracy Pumping Plant export capacity.
- C Implementation of the Joint Point of Diversion (see EWA Operating Principles in Attachment 2) for the SWP and CVP, and construction of interties.
- C Construction of an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.
- C Construction of operable barriers taking into account fisheries, water quality and water stage needs in the south Delta.
- C Operational changes to the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities.

Under the Preferred Program Alternative, north Delta improvements include:

- C Studying and evaluating a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in continuous improvements toward CALFED drinking water goals. Potential diversion sites between and including Hood and Georgiana Slough will be considered as part of this evaluation.

The diversion facility on the Sacramento River likely would include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The diversion facility on the Sacramento River is an action to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The assessments of the Delta Cross Channel and the diversion facility on the Sacramento River will be completed simultaneously. The results of all three of these evaluations will be shared with the Delta Drinking Water Council or its successor and the expert panel evaluating fish impacts of Delta conveyance. If these evaluations demonstrate that a diversion facility on the Sacramento River is necessary to address drinking water quality concerns and can be constructed without adversely affecting fish populations, a decision on siting the facility will be made and permit and environmental review pursued to allow construction as a part of the Preferred Program Alternative.

- C Construct new setback levees, dredge and/or improve existing levees along the channels of the lower Mokelumne River system from Interstate 5 downstream to the San Joaquin River.

The Preferred Program Alternative includes a process for determining the conditions under which any future additional conveyance facilities or water management actions would be taken. The process would include:

- C An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) total organic carbon.
- C An evaluation based on two independent expert panels' reports -- one on the Program's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery.

III. PROGRAMMATIC EIS/EIR

During extensive public scoping meetings, the CALFED Agencies determined that the wide array of potential actions, the broad geographic area affected, the length of time for implementation, and the inter-related nature of the resources and goals for the CALFED Program indicated that a programmatic level environmental review would allow for the broadest disclosure and improve the opportunity for decision makers and the public to consider alternatives. Identifying and analyzing potential future combined effects of a long-term, multi-stage proposal allows a greater opportunity to design actions that avoid, minimize, or mitigate identified impacts. This Programmatic EIS/EIR, or “program EIR” as used in CEQA, will be used to tier more detailed environmental documents for project-specific actions during Phase III, following approval of the CALFED Program.

The degree of specificity required in an EIR corresponds to the degree of specificity involved in the underlying activity which is described in the EIR. “An EIR on a project such as the adoption or amendment of a comprehensive zoning ordinance or a local general plan should focus on the secondary effects that can be expected to follow from the adoption, or amendment, but the EIR need not be as detailed as an EIR on the specific construction projects that might follow.” CEQA Guidelines Section 15146. See also *Rio Vista Farm Bureau Center v. County of Solano* (1992) 5 Cal.App.4th 351, 371.

The alternatives examined in the EIS/EIR represent basic approaches to concurrently solving the four areas of critical concern in the Bay-Delta. Included within each of those approaches are a multitude of potential project-specific activities which are consistent with the Program, but for which details are not yet known, and about which individual decisions remain to be made. The EIS/EIR presents information at a broad planning level of detail, including descriptions covering regional and solution area impacts. In essence, the overall and long-term environmental consequences of the potential proposed actions at the end of the CALFED Program’s 30-year time span are described.

As a program-level document, the EIS/EIR does not analyze project-specific impacts of future projects at specific locations and therefore cannot predict with certainty which impacts will occur and what project-specific mitigation measures will be appropriate for mitigating those impacts in these second-tier projects. Consequently, the EIS/EIR identifies mitigation strategies, which are an array of actions that could be used to avoid or minimize the types of environmental impacts anticipated as a result of the CALFED Program. These mitigation strategies will provide the basis to tailor more specific mitigation measures for individual projects, and for purposes of CEQA, they serve as mitigation measures at a programmatic level.

As the Program is implemented and additional information is developed on the effectiveness of ecosystem restoration actions and mitigation measures, the lead agency for subsequent tiered environmental documents may also develop and consider additional project-specific mitigation

measures. By implementing the Program in stages, these second-tier projects can also be designed to minimize environmental impacts identified as the result of this new information.

At the project-specific level of environmental review, the lead agency will review the site characteristics, size, nature, and timing of proposed actions to determine whether the impacts of the specific projects are potentially significant or can be avoided or mitigated to a less-than-significant level. However, since it is not possible to precisely assess the project-specific impacts or potential for mitigation of project-level impacts as part of this programmatic analysis, the EIS/EIR treats these impacts as potentially significant at a programmatic level. Where it is anticipated that feasible mitigation measures may not be available to avoid or reduce these impacts to a less-than-significant level, based on currently available information, this document treats these impacts at the programmatic level as potentially significant and unavoidable, even where this conclusion is not certain. Future review in tiered environmental documents will be needed to determine the impacts of specific actions and appropriate mitigation for project-specific actions.

This EIS/EIR is structured to be used as a tiering document. Individual, second-tier projects can use this analysis as a basis from which to supplement and refine the level of detail and can incorporate by reference relevant provisions in the EIS/EIR. Tiering will assist the agencies in focusing on issues that are ripe for decision at each stage of environmental review and to exclude from consideration issues that have already been decided or that are not ready for decision. Second-tier documents will be prepared to concentrate on issues specific to the individual project being implemented and site(s) chosen for the action before construction can be initiated. The environmental review and initial studies for project-specific, second-tier projects can incorporate by reference the discussions in the program EIR, and “concentrate on the environmental effects which (a) are capable of being mitigated, or (b) were not analyzed as significant effects on the environment in the prior environmental impact report.” Pub. Resources Code Section 21068.5.

The thresholds of significance for most of the environmental resources discussed in this impact analysis are described in qualitative terms and cover a broader spectrum of impacts than would be included in a project-specific, project-level analysis. The thresholds used in this EIS/EIR are intended to identify potentially significant impacts at a programmatic level and to provide guidance for developing significance criteria for second tier environmental review. For future analyses, the measure of significance will vary depending on the nature and type of the proposed actions, the site characteristics where the actions take place, and how they affect the existing conditions at the time of the proposed actions.

Some mitigation strategies and measures may cause other adverse environmental impacts at the same time that they mitigate impacts addressed in this EIS/EIR. At this programmatic level of analysis, it is impractical to analyze the specific impacts or the measures needed to mitigate those secondary impacts. During review of project-specific proposals, the additional impacts created by the application

of mitigation strategies, if any, will be analyzed, and further measures added as necessary to avoid or reduce those impacts.

Where a second-tier project involves impacts that are addressed in the EIS/EIR, the mitigation strategies adopted in these findings will be used by the lead agencies as a basis to formulate project-level mitigation measures and enforcement programs. Because all the potential actions and impacts for tiered projects cannot be anticipated at a programmatic level, each lead agency needs to select those strategies applicable to the impacts associated with the specific location and type of action. The lead agencies and the Science Program of the CALFED Program will monitor the mitigation used for second-tier projects. The commitment by the CALFED Agencies to apply the relevant mitigation strategies, and to develop and enforce mitigation measures pursuant to those strategies, is included in the Record of Decision for the CALFED Program.

IV. ADMINISTRATIVE RECORD

For the purposes of CEQA and the findings set forth below, the administrative record for the Secretary's decision on the CALFED Program consists of the following documents:

1. The March 1998 Draft Programmatic EIS/EIR, including all appendices, technical reports, documents cited in the Draft Programmatic EIS/EIR, letters submitted on the Draft, and public hearing transcripts;
2. The June 1999 Draft Programmatic EIS/EIR, including all appendices, technical reports, documents cited in the Draft Programmatic EIS/EIR, letters submitted on the Draft, and public hearing transcripts;
3. The July 2000 Final Programmatic EIS/EIR, including all appendices and technical reports, comments and responses to comments, and documents cited in the Final Programmatic EIS/EIR;
4. All notices issued by the Resources Agency and Federal lead agencies to comply with CEQA, NEPA, or with any other law governing the processing and approval of the Program;
5. Relevant CALFED State and Federal agency reports, studies, decisions, official opinions, modeling data, informal communications, planning documents and other environmental impact reports or studies used in preparation of the Programmatic EIS/EIR;
6. Other relevant State, Federal and local agency reports, studies, decisions, official opinions, modeling data, informal communications, planning documents and other environmental impact reports or studies used in preparation of the Programmatic EIS/EIR;
7. Any EIRs, EISs, and other environmental documentation prepared by CALFED Agencies and other public agencies for other actions and programs relevant to the Programmatic EIS/EIR;
8. All documents submitted by members of the public and non-privileged documents submitted by public agencies in connection with the Programmatic EIS/EIR on the Program;

9. All relevant reports, documentary or other evidence submitted at workshops, public meetings and public hearings on the Program;
10. Minutes and meeting packets of all Bay-Delta Advisory Committee meetings, and its subcommittees and workgroups;
11. Minutes and verbatim transcripts of all public hearings held by the CALFED Program on the Programmatic EIS/EIR;
12. All non-privileged, relevant reports, memoranda, maps, letters and other planning documents prepared by the Program staff, consultants, and CALFED Agencies for the development of the Programmatic EIS/EIR;
13. Scientific, technical and other professional judgment, published and unpublished articles, and other information relied upon by CALFED staff and participants in CALFED workshops and informal communications;
14. Any other written materials relevant to the CALFED Program's compliance with CEQA and NEPA or to the Resources Agency's decision on the project; and
15. The Bay-Delta Accord, Accord Extensions, and the Principles for Agreement, the Record of Decision for this Program dated August 28, 2000, and other relevant agreements regarding the CALFED Program.

The custodian of the documents comprising the administrative record for the Secretary's decision is Steve Ritchie, the Acting Executive Director of the CALFED Bay-Delta Program, or his successor. The location of the administrative record is the office of the CALFED Bay-Delta Program, 1416 Ninth Street, Suite 1155, Sacramento, California 95814.

V. MITIGATION MONITORING PLAN

The monitoring process adopted by the CALFED Agencies carries out Section 21081.6 of CEQA that requires public agencies to adopt a reporting or monitoring program whenever a project or program is approved that includes mitigation measures identified in an environmental document. Projects and activities that implement the CALFED Preferred Program Alternative will be monitored through the Science Program to ensure that issues and mitigation strategies in this EIS/EIR process are adequately considered and used to develop mitigation measures for second-tier projects. CALFED Agencies have committed to use this mitigation monitoring plan at the project level for any second-tier projects within the scope of this EIS/EIR. If and when a new governing agency with authority to carry out CALFED Program projects is created by legislation, this policy would apply to that new agency as well. This commitment is part of the Record of Decision for the CALFED Program and signed by each of the CALFED Agencies, including the Resources Agency.

Projects and activities implementing the Preferred Program Alternative will undergo future environmental analysis as required by NEPA and CEQA tiering from this EIS/EIR. In order to qualify for CALFED funding, any implementing project must demonstrate its compliance with this mitigation monitoring plan. As part of these second-tier environmental reviews, the lead agency for each of these projects will use the mitigation strategies identified in the program document as starting points to determine their applicability to a specific project and to develop additional mitigation measures for significant adverse impacts identified in the project-specific analysis. Because all the potential actions and impacts for tiered projects cannot be anticipated at a programmatic level, each project needs to select those strategies applicable to the impacts associated with the specific location and type of action. For purposes of CEQA, the mitigation strategies in the Final EIS/EIR also serve as mitigation measures at a programmatic level.

The NEPA/CEQA monitoring process includes review, guidance, and reporting components. The CALFED Agencies will prepare a checklist of the mitigation strategies (Section VI) to provide guidance to lead agencies preparing environmental documents that tier from the programmatic EIS/EIR. The lead agencies for second tier documents will note which applicable programmatic mitigation strategies are being adopted and used for mitigation measures and explain why other are not. The lead agencies will provide a schedule for implementing the adopted mitigation measures, and for reviewing the implementation of those measures. The lead agencies will provide a written report periodically, but at least once a year to the CALFED chief scientist as to the progress in implementing the mitigation measures and efficacy thereof. A summary of this information will be included in the annual report to the Governor, the Secretary of the Interior, Congress, the California Legislature, Federal and State government agencies, stakeholders, and the general public.

VI. FINDINGS ON SPECIFIC IMPACTS AND MITIGATION MEASURES

A. Findings on Specific Impacts and Adoption of Mitigation Measures

Chapters 5, 6 and 7 of the EIS/EIR set forth environmental effects of the Preferred Program Alternative that would be potentially significant or significant in the absence of mitigation measures. These impacts are set forth below, along with mitigation measures adopted, that will avoid or substantially lessen those potentially significant or significant impacts. Also set forth are certain significant impacts that cannot be avoided or reduced to a less than significant level even with the adoption of all feasible mitigation measures proposed in the EIS/EIR. In adopting these findings and mitigation measures, the Secretary also adopts a Statement of Overriding Considerations setting forth the economic, social and other benefits of the CALFED Program that will render these significant impacts acceptable.

The Secretary is not required to adopt mitigation measures or adopt policies as part of the Program for impacts that are less than significant.

In the following sections, the Secretary summarizes the significant impacts of the Program and describes whether the impacts remain significant or are reduced to less than significant with all adopted feasible mitigation measures. The Secretary also identifies those mitigation measures that are within the jurisdiction and responsibility of other agencies. Subsection B below lists those mitigation measures which were suggested by commentators but are not adopted or are rejected as infeasible for technical, social, economic or other reasons.

**Section 5.3 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts On Water Quality
Associated with the Preferred Program Alternative**

Impact 1. Releases of inorganic and organic suspended solids into the water column and turbidity resulting from increased erosion during construction, dredging, or drainage of flooded lands.

Total suspended solids (TSS) is the primary contaminant of concern that would be affected by the construction activities of the Program. Soil particles released from construction activities increase TSS content of Delta waters. The Ecosystem Restoration Program, Levee System Integrity Program, and Water Quality Program actions would release quantities of soil, including nutrients and organic matter, into the water column during in-water and waterside construction, and flowing water would dislodge soil particles from new levees and wetlands during the initial water-soil contact period.

Short-term effects on water quality from construction of surface water reservoirs would result from ground disturbance and consequent increased soil erosion rates. Groundwater storage projects could use injection wells or spreading basins that involve some ground disturbance or increased soil erosion. Earth moving and dredging associated with construction of Delta facilities could result in increased sediment loads caused by erosion and sediment disturbance and releases of nutrients and natural organic matter into the water column. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less-than-significant.

Mitigation Strategies:

1. Use best construction and drainage management practices to avoid transport of soils and sediments into waterways.
2. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
3. Use sediment curtains to contain turbidity plumes during dredging.
4. Schedule ground disturbing construction during the dry season.

Impact 2. Releases of toxic substances, such as pesticides, selenium, and heavy metal residues, into the water column during construction and dredging and other Program actions.

Construction activities associated with the Program are expected to discharge soil particles and the associated release of toxicants in the vicinity of construction sites. Toxic substances could be released during the demolition of levees because some of the older levees were built with dredge spoils. Waterside construction activities for the Levee System Integrity Program and Ecosystem Restoration Program could result in short-term effects on water quality if toxic substances contained in old levees or in channel sediments are released during waterside levee work or dredging.

Dredging may expose mercury-laden sediments and may mobilize other toxic elements. Earth moving and dredging associated with construction of Delta facilities could result in releases of toxic substances. Disturbances to previously farmed soils could release residual agricultural pesticides, including organochlorinated pesticides, mercury, nutrients, and other chemicals that may adversely affect water quality. In addition, creating shallow water habitat in areas that would receive mercury from receiving water sources has the potential to increase methyl mercury levels in the ecosystem. Storing water in surface reservoirs may mobilize trace elements, particularly in the deeper parts of the reservoirs where dissolved oxygen concentrations may become depressed. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies

1. Use best construction and drainage management practices to avoid transport of soils and sediments into waterways.
2. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
3. Schedule ground disturbing construction during the dry season.
4. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
5. Identify and investigate issues regarding beneficial reuse of dredged material, including conducting core sampling and analysis of proposed dredged areas, and implement engineering solutions to avoid or prevent environmental exposure to toxic substances after dredging.
6. Continue the studies concerning reuse of beneficial Bay dredge material in the Delta for potential water quality impacts related to salinity, metals mobilization, and other environmental and health hazards.
7. Investigate all potential sources of borrow and the cost effectiveness of each source's use for levee rehabilitation and construction, including the use of sediment traps as a source of borrow.
8. Prepare a borrow plan that includes future costs and options for obtaining adequate quantities of borrow needed for implementation of the Levee System Integrity Program.
9. Use sediment curtains to contain turbidity plumes during dredging.
10. Cap exposed toxic sediments with clean clay/silt and protective gravel.

Impact 3. Net increases in salinity if evaporation increases converting irrigated cropland to wetlands.

Replacing certain irrigated crops with wetlands could result in a net increase in water salinity because evapotranspiration would increase. However, the conversion from irrigated crops to wetlands also reduces salinity due to the reduction or elimination of applied salts. Evaporation may also slightly reduce Delta outflow, resulting in a minimal increase in salinity from the intrusion of saltwater from the

ocean. Preliminary modeling shows that certain ERP actions, such as reconstructing islands and restoring tidal marshes in the North Bay, may have substantial beneficial impacts on salinity during peak salinity conditions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Release additional, higher-quality water from enlarged or additional off-stream storage, or from additional groundwater storage, to decrease salinity levels and prevent intrusion.
2. Release additional water from storage in existing reservoirs or groundwater basins.
3. Restore additional riparian vegetation to increase shading of channels and reduce evaporation.
4. Reconstruct islands and restore tidal marshes in the North Bay.

Impact 4. Increased electrical conductivity (a measure of salinity) of water in the Delta.

Export or storage of additional water could slightly reduce net Delta outflow at certain times of the year, increasing salinity intrusion. This impact is considered less than significant.

If the diversion facility on the Sacramento River is constructed, no significant adverse impacts related to salinity are expected.

If the diversion facility on the Sacramento River is not constructed, the Preferred Program Alternative could increase electrical conductivity (EC - a relative measure of salinity) of water in the central Delta, in the south Delta, and in the San Joaquin River in the west Delta. This impact is considered significant.

Note: The programmatic scope and level of uncertainty of the water quality modeling make it impossible to predict at a finite, localized level whether this increase in EC could result in a significant impact. However, for purposes of this programmatic analysis, this impact was assumed to be significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Release additional water from enlarged or additional off-stream storage, or from additional groundwater storage.
2. Release additional water from storage in existing reservoirs or groundwater basins.
3. Relocate diversion intakes to locations with better source water quality.

4. Modify water conveyance operations, including DCC and south Delta operations. CALFED Program implementation will occur in phases to permit new information gained from studies and monitoring to influence changes in facility design and operations.

Impact 5. Increases of TOC in river water caused by the increased contact between flowing or ponded water and vegetation or peat soils that would result from conversion of agricultural lands to wetlands and from actions in other Program elements.

Replacing irrigated cropland with wetlands could change the concentration of total organic carbon (TOC) in river water, but it is currently unknown whether it would increase or decrease. If the Ecosystem Restoration Program causes a reduction in TOC concentrations, there could be an adverse effect on biological productivity in the Delta if carbon is the limiting ecological factor. The reduction of TOC would improve the suitability of Delta waters as a drinking water source. If TOC concentrations are increased then the biological productivity may be increased and the suitability of water for drinking water will decrease. Storing water in reservoirs on Delta islands could increase TOC production from the peat soils in the Delta. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Treat wastewater at the source, such as Delta drains, upgrade water treatment processes at drinking water treatment plants and/or provide treatment at the point of use (consumer's tap).
2. Use innovative, cost-effective disinfection processes (for example, UV irradiation, and ozonation, in combination with other agents) that form fewer or less harmful DBPs.
3. Separate water supply intakes from discharges of agricultural and urban runoff.
4. Apply agricultural and urban BMPs, and treat drainage from lands with concentrations of potentially harmful constituents to reduce contaminants. Treat drainage from agricultural lands underlain by peat soils to remove TOC.
5. Relocate diversion intakes to locations with better source water quality.

Impact 6. Increased water temperatures and resultant decreased dissolved oxygen concentrations due to the increased residence time of water in the Delta and from Program actions.

Barriers in the south Delta would partially block Old River, Grant Line Canal, and part of the Middle River. The barriers would diminish tidal flow, reducing connectivity to other Delta channels and altering basic hydraulic features that affect sediment and nutrient movement and water quality

conditions. Increases in water temperature and reduction of dissolved oxygen could occur. Fisheries and aquatic impacts are addressed in Section 6.1.

Temperatures could increase or decrease in the Sacramento River if inflows of warmer or cooler water occur from new off-stream reservoirs. Diversion of water to off-stream reservoirs would reduce flows downstream of the diversion and could increase water temperatures. Water transfers could affect water quality through changes to river flow and water temperature. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Release additional water from enlarged storage or additional off-stream storage, or from additional groundwater storage.
2. Release additional water from storage in existing reservoirs or groundwater basins.
3. Operate storage facility operations to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream water quality and habitat.
4. Restore additional riparian vegetation to increase the shading of channels and decrease evaporation.
5. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects on water quality due to water transfers. The criteria for future water transfer proposals include:
 - Transfers must not harm fish and wildlife resources and their habitats.

Impact 7. Decreases in in-stream water quality if water use efficiency measures or water transfers reduce diluting flows.

Increased water use efficiency could adversely affect water quality if the volume of municipal wastewater or agricultural tailwater discharged into a stream is reduced but the mass load of salts and other contaminants in the discharge remains the same. Water transfers could affect water quality primarily through changes to river flow and water temperatures. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Improve treatment levels provided at municipal wastewater treatment plants to upgrade the quality of the constituents of concern discharged to receiving waters in order to compensate for the reduction in dilution caused by improved water use efficiency. Improved salt management of wastewater inputs to treatment plants could reduce salt concentrations in discharges.

2. Release additional water from enlarged or additional off-stream surface storage, or from additional groundwater storage.
3. Release additional water from storage in existing reservoirs or groundwater basins.
4. Utilize the criteria in the Water Transfer Program, listed above under Impact 6, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 8. Increases in concentrations of constituents of concern if water transfers reduce in-stream flows and deplete river assimilative capacities.

Water transfers could increase constituents of concern if river flows are reduced, increasing water temperatures and depleting assimilative capacities. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Improve treatment levels provided at municipal wastewater treatment plants to upgrade the quality of the constituents of concern discharged to receiving waters in order to compensate for the reduction in dilution caused by improved water use efficiency. Improved salt management of wastewater inputs to treatment plants could reduce salt concentrations in discharges.
2. Release additional water from enlarged or additional off-stream surface storage, or from additional groundwater storage.
3. Release additional water from storage in existing reservoirs or groundwater basins.
4. Use existing river channels for water transfers and time the transfers to avoid adverse water quality impacts.
5. Utilize the criteria in the Water Transfer Program, described above under Impact 6, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 9. Increase in methylation of mercury in constructed shallow-water habitat.

Mercury contaminants in sediments could become available in the water column as a result of implementing the ERP. Creating shallow-water habitat in areas that would receive mercury from surface water sources has the potential to increase methyl mercury levels in the ecosystem. Under anaerobic conditions, such as after creating a wetland, mercury is methylated and thus mobilized in the water column. Methyl mercury in the water column would be available to fish and other members of

the food chain. Fisheries and aquatic impacts are addressed in Section 6.1. Public health impacts are addressed in Section 7.12. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Test for mercury in soils and locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediments are implemented.

Impact 10. Degradation of surface water by the transfer of poorer quality groundwater.

Water pumped from the ground would contain less suspended solids, more dissolved solids, and generally higher nitrates than the source water. If the water is used directly by municipalities or for agricultural use, its suitability for use would be reduced somewhat by its increased mineral concentrations. If the water is pumped into a surface stream during low-flow periods, it could substantially reduce water temperatures and could result in increased biological productivity due to the presence of nitrate. Groundwater impacts are addressed in Section 5.4. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Release additional water from enlarged or additional off-stream storage, or from additional groundwater storage.
2. Release additional water from storage in existing reservoirs or groundwater basins.
3. Provide funding and assistance to develop new groundwater basin plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
4. Reduce or discontinue groundwater pumping.
5. Monitor and test groundwater wells and aquifers.
6. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - Water rights of all legal water users must not be impaired.
 - Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.

Impact 11. Changes in natural flow regimes in areas where new surface storage is built.

Changes in streamflow would result from releases from, and diversions to, surface storage. Typically, surface water reservoirs would be used to store abundant spring flows for later release and use in dry months or years. Diversion of water to off-stream reservoirs would reduce flows downstream of the diversion and could increase water temperatures. Off-stream reservoirs would alter the hydrology of intermittent or small perennial streams on which they are built. Spring flows would be reduced or eliminated compared to unimpaired flows, and flow in naturally dry periods would be increased. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Operate storage facility to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream water quality and habitat.

Impact 12. Surface storage innundation of toxic material.

Storing water in surface reservoirs may mobilize trace elements found in the substrate, particularly in the deeper parts of the reservoirs where dissolved oxygen concentrations may become depressed. For example, mercury compounds are present in rocks and sediment in the water column in some parts of the Sacramento Valley. Under certain conditions, these compounds may be converted into biologically available methyl mercury. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Avoid innundation or design solutions to innundation of toxic materials, such as covering with an engineered cap.
2. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.

**Section 5.4 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Groundwater
Associated with the Preferred Program Alternative**

Impact 1. Changes in groundwater levels.

Groundwater transfers—or surface water transfers based on groundwater substitution—could result in significant adverse impacts on third-party groundwater users, with adverse effects in the source water area. Such impacts might include lower groundwater levels and higher pumping costs, impacts on vegetation dependent on groundwater, streamflow depletions, or, in extreme cases, losses of existing wells.

Agricultural water conservation, including a reduction in deep percolation or applied irrigation or reduction in seepage from irrigation conveyance facilities, can result in local reductions in groundwater recharge. Conservation or reuse of treated wastewater, otherwise applied to spreading basins for recharge of local groundwater resources, could reduce the amount of artificial recharge.

If improperly managed, groundwater storage programs could result in significant adverse impacts associated with changes in groundwater levels, including higher pumping costs, reduced well yields, impacts on vegetation dependent on groundwater, and streamflow depletions. During extended drought periods, unforeseen groundwater level declines could occur as a result of overpumping in the storage facility area, and adverse impacts on third-party users could be significant. In extreme cases, third-party users could lose the use of some wells as a result of groundwater quality degradation and lower groundwater levels. Third-party impacts are also discussed in Sections 7.2 and 7.14.

In-Delta storage could increase hydraulic head at the storage site. The increase in the hydraulic head, greater wetted surface area, and larger volume of water in the in-Delta reservoir relative to the rivers could cause substantial groundwater underflow toward the tracts on the opposite banks of the island storage. Leakage could occur through the unlined canal transferring water from the diversion facility on the Sacramento River, waterlogging the soils along the alignment of the canal. Seepage could also be caused by the flooding of Delta islands for habitat restoration and from altered levee vegetation management practices. Related seepage impacts to soils, agricultural land, and flood control are addressed in Sections 5.5, 7.1, and 7.8. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Create additional groundwater or surface water storage facilities to improve water supply reliability and decrease overdraft.
2. Support voluntary transfers of water from basins with excess supplies.
3. Purchase water rights from willing sellers (including transferring water rights between sectors—for example, from agricultural to municipal uses).

4. Support local groundwater management planning that reduces overdraft and third-party impacts.
5. Implement conservation measures to reduce demand.
6. Integrate the Ecosystem Restoration Program floodplain restoration efforts with setback levees.
7. Allow water levels to increase periodically.
8. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
9. Support local efforts in developing new groundwater basin management plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
10. Design new levees and improve existing levees to withstand hydraulic stresses and seepage from flooding Delta islands.
11. Monitor water-level conditions on islands adjacent to flooded Delta islands.
12. Install interception wells at in-Delta storage facilities to control seepage.
13. Control seepage through pumping and other appropriate measures.
14. Line conveyance canals to prevent seepage.
15. Temporarily remove recharge systems from service to avoid effects associated with high water tables.
16. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects on groundwater due to water transfers. The criteria for future water transfer proposals include:
 - Water rights of all legal water users must not be impaired..
 - Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.

Impact 2. Increased demand for groundwater supplies.

Surface water transfers based on groundwater substitution may increase the demand for groundwater supplies.

Agricultural efficiency improvements may lead some growers to switch to groundwater as a more reliable source of high-quality water. This could result in groundwater declines and land subsidence.

Additional in-stream flow requirements could result in reduced frequency of meeting agricultural, and to some extent, municipal and industrial demands in the San Joaquin River Region. This would put increased pressure on groundwater resources to supply the unmet demand and could result in significant adverse impacts on groundwater resources in some basins during low runoff years. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Create additional groundwater or surface water storage facilities to improve water supply reliability and decrease overdraft.
2. Support voluntary transfers of water from basins with excess supplies.
3. Purchase water rights from willing sellers (including transferring water rights between sectors—for example, from agricultural to municipal uses).
4. Implement conservation measures to reduce demand.
5. Support local and regional efforts to increase water supplies from recycling.
6. Develop alternative water supplies.
7. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
8. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 3. Increased groundwater overdraft.

Groundwater transfers—or surface water transfers based on groundwater substitution—could result in significant adverse impacts on third-party groundwater users, with adverse effects in the source water area. Such impacts might include lower groundwater levels and higher pumping costs, or, in extreme cases, losses of existing wells.

Agricultural efficiency may lead some growers to switch to groundwater as a more reliable source of high-quality water. This could result in groundwater overdraft.

If improperly managed, groundwater storage programs could result in significant adverse impacts associated with overdrafting the aquifer, increased pumping costs, reduced well yields, and streamflow depletions. During extended drought periods, unforeseen groundwater level declines could occur as a result of overpumping in the storage facility area, and adverse impacts on third-party users could be significant. In extreme cases, third-party users could lose the use of some wells as a result of groundwater quality degradation and lower groundwater levels. Third-party impacts are also discussed in Sections 7.2 and 7.14. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Support local groundwater management planning that reduces overdraft and third-party impacts, including reduction or discontinuance of groundwater pumping.
2. Support increased regulations regarding new and existing domestic wells and septic systems.
3. Monitor and test groundwater wells and aquifers.
4. Limit new septic tank systems in vulnerable areas.
5. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
6. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
7. Support local agencies in developing new groundwater basin management plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
8. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 4. Increased land subsidence.

Groundwater transfers—or surface water transfers based on groundwater substitution—could result in significant adverse impacts on third-party groundwater users, with adverse effects in the source water area. Such impacts might include lower groundwater levels, land subsidence, or, in extreme cases, losses of existing wells.

Agricultural efficiency may lead some growers to switch to groundwater as a more reliable source of high-quality water. This could result in groundwater declines and possibly land subsidence.

If improperly managed, groundwater storage programs could result in significant adverse impacts associated with overdrafting the aquifer, including land subsidence. During extended drought periods, unforeseen groundwater level declines could occur as a result of overpumping in the storage facility area, and adverse impacts on third-party users could be potentially significant, including the loss of use of some wells. Third-party impacts are also discussed in Sections 7.2 and 7.14. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Support local groundwater management planning that reduces overdraft and third-party impacts, including reduction or discontinuation of groundwater pumping.

2. Support increased regulations regarding new and existing domestic wells and septic systems.
3. Monitor and test groundwater wells and aquifers.
4. Limit new septic tank systems in vulnerable areas.
5. Allow water levels to increase periodically.
6. Import new soil (including dredged spoil) to raise land surface.
7. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
8. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
9. Support local agencies in developing new groundwater basin management plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
10. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 5. Increased degradation of groundwater quality from contaminant movement, salt-water intrusion, or naturally poor-quality water drawn into the aquifer.

Groundwater transfers—or surface water transfers based on groundwater substitution—could result in significant adverse impacts on third-party groundwater users, with adverse effects in the source water area. Such impacts might include degradation to groundwater quality, resulting in losses of existing wells in extreme cases.

Agricultural water conservation, including a reduction in deep percolation or applied irrigation or reduction in seepage from irrigation conveyance facilities, can result in local reductions in groundwater recharge. The loss of recharge would not necessarily be accompanied by a decrease in loading of salts and agricultural chemicals since irrigation systems generally are operated to ensure that these chemicals are leached through the root zone of plants.

Adverse impacts on groundwater may result from artificial recharge systems and from in lieu recharge, in which surface water is substituted for groundwater use so that natural recharge of the aquifer can occur. Differences in the chemical or biological properties of the recharge water relative to the water in the targeted aquifer (such as dissolved oxygen concentration, pH, mineral content, temperature, microbial population, and other parameters) could result in significant adverse impacts. For example, introduction of nutrients can cause existing dormant microbial populations to bloom. New, undesirable microbial populations may be introduced. Changes in chemistry can cause precipitation or solution of minerals. In some locations, recovery of water levels could remobilize residual chemical contaminants that have been left behind by falling water levels. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Support voluntary transfers of water from basins with excess supplies.
2. Support increased regulations regarding new and existing domestic wells and septic systems.
3. Monitor and test groundwater wells and aquifers.
4. Limit new septic tank systems in vulnerable areas.
5. Allow water levels to increase periodically.
6. Reduce or discontinue groundwater pumping.
7. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
8. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
9. Treat extracted groundwater at the well head.
10. Dilute poor-quality groundwater with higher quality water.
11. Support local efforts in developing new groundwater basin plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
12. Temporarily remove recharge systems from service to avoid effects associated with high water tables.
13. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

Impact 6. Impacts from groundwater recharge and storage system operations.

If improperly managed, groundwater storage programs could result in significant adverse impacts associated with overdrafting the aquifer, including land subsidence, water quality degradation, increased pumping costs, reduced well yields, impacts on vegetation dependent on groundwater, and streamflow depletions. During extended drought periods, unforeseen groundwater level declines could occur as a result of overpumping in the storage facility area, and adverse impacts on third-party users could be significant. In extreme cases, third-party users could lose the use of some wells as a result of groundwater quality degradation and lower groundwater levels. Third-party impacts are also discussed in Sections 7.2 and 7.14.

Differences in the chemical or biological properties of the recharge water relative to the water in the targeted aquifer (such as dissolved oxygen concentration, pH, mineral content, temperature,

microbial population, and other parameters) could result in significant adverse impacts. For example, introduction of nutrients can cause existing dormant microbial populations to bloom. New, undesirable microbial populations may be introduced. Changes in chemistry can cause precipitation or solution of minerals. In some locations, recovery of water levels could remobilize residual chemical contaminants that have been left behind by falling water levels.

In-Delta storage could increase hydraulic head at the storage site. The increase in the hydraulic head, greater wetted surface area, and larger volume of water in the in-Delta reservoir relative to the rivers could cause substantial groundwater underflow toward the tracts on the opposite banks of the island storage. Leakage could occur through the unlined canal transferring water from the diversion facility on the Sacramento River, waterlogging the soils along the alignment of the canal. Related seepage impacts to soils, agricultural land, and flood control are addressed in Sections 5.5, 7.1, and 7.8. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Support local groundwater management planning that reduces overdraft and third-party impacts.
2. Support local and regional efforts to increase water supplies by recycling.
3. Support increased regulations regarding new and existing domestic wells and septic systems.
4. Monitor and test groundwater wells and aquifers.
5. Limit new septic tank systems in vulnerable areas.
6. Allow water levels to increase periodically.
7. Support local projects to recharge aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
8. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize the drawdown of the aquifer.
9. Dilute poor-quality groundwater with higher quality water.
10. Support local agencies in developing new groundwater basin management plans or expanding existing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operation and maintenance specifications and procedures, and conditions under which corrective actions are taken.
11. Design new levees and improve existing levees to withstand hydraulic stresses and seepage from flooding Delta islands.
12. Monitor water-level conditions on islands adjacent to flooded Delta islands.
13. Install interception wells at in-Delta storage facilities to control seepage.
14. Control seepage through pumping and other appropriate measures.
15. Line conveyance canals to prevent seepage.

16. Temporarily remove recharge systems from service to avoid effects associated with high water tables.
17. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

**Section 5.5 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts On Geology and Soils
Associated with the Preferred Program Alternative**

Impact 1. Conversion of agricultural land soils for levee system construction and potential for erosion on outboard slope of levees.

The use of agricultural soils for levee system construction could result in significant adverse changes to soils in the affected areas. Agricultural soils would be covered where new setback levees are constructed. Conversion of agricultural land is addressed in Section 7.1. Soil erosion outboard of the levees could be reduced by habitat restoration and sediment deposition measures, but would be subject to erosion during floods. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Protect flooded Delta island inboard levee slopes against wind and wave erosion with vegetation, soil matting, or rock.
2. Protect exposed soils with mulches, geotextiles, and vegetative ground covers during and after project construction activities in order to minimize soil loss.
3. Implement erosion control measures and bank stabilization projects.
4. Increase sediment deposition and provide substrate for new habitat by planting terrestrial and aquatic vegetation.
5. Re-use dredged materials to reduce or replace soil loss.
6. Investigate the cost effectiveness and safety of using sediment traps as a source of borrow.
7. Leave crop stubble from previous growing season in place while fallowing and employ cultivation methods that will cause the least amount of disturbance in order to minimize erosion of surface soils.
8. Prepare and implement best construction management plans.
9. Prepare and implement a water quality and soils monitoring program.
10. Prepare and implement construction mitigation plans.

Impact 2. Increases in local subsidence from potential increased reliance on groundwater use.

An increased reliance on groundwater could result in localized subsidence from depletion of groundwater resources. On-farm efficiency improvements from the Water Use Efficiency Program could lead to increased reliance on groundwater due to irrigation needs and secondary use issues. Highly efficient irrigation requires more frequent water deliveries, some of which may not be met from surface water sources, and impoundment of tailwater leaves less surface water available to secondary users. Such users may turn to alternative sources, such as groundwater. An increased reliance on

groundwater could result in localized subsidence from depletion of groundwater resources. This impact is significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Monitor groundwater levels and subsidence in areas of increased reliance on groundwater resources.
2. Minimize and avoid direct groundwater transfers or groundwater substitution transfers from regions: 1) experiencing long-term overdraft, 2) where subsidence historically has occurred, or 3) where local extensometers indicate that subsidence rates are increasing.
3. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.

Impact 3. Increases in wind and soil erosion and in soil salinity due to fallowed agricultural lands.

Increases in soil erosion and soil salinity may result from Water Transfer Program and Water Use Efficiency Program actions. Erosion and reduction of soil cover may occur on land idled as a result of water transfers. Soil salinity may increase on fallowed land if salts are not flushed from the soil. Soil salinity could increase if irrigation water is replaced with lower quality water from groundwater substitution. Water use efficiency measures may reduce the volume of water necessary to flush the salinity from the soil. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Protect exposed soils with mulches, geotextiles, and vegetative ground covers during and after project construction activities in order to minimize soil loss.
2. Leave crop stubble from previous growing season in place while fallowing and employ cultivation methods that will cause the least amount of disturbance in order to minimize erosion of surface soils.
3. Limit the salinity of replacement water, relative to local conditions, in water transfers.
4. Ensure that the volume of irrigation water used is sufficient to flush accumulated salts from the root zone.

Impact 4. Increased construction-related short-term soil erosion, and increased sediment deposition and soil compaction.

Direct, indirect, and construction-related activities associated with the Ecosystem Restoration Program, Levee System Integrity Program, Water Quality Program and Watershed Program could alter or displace soils in the immediate vicinity of activities. Compaction of soil by heavy equipment during construction would temporarily affect the physical characteristics of the soil, including decreasing permeability and increasing runoff. Watershed Program activities could cause short-term soil erosion and increased sediment deposition during the construction of stream and watershed restoration projects or roadway improvements. In addition, reservoir construction could cause increased erosion on areas cleared for storage facilities or access roads. Short-term increases in erosion rates and soil compaction would result from construction of conveyance improvements, including constructing a screened intake, modifying existing channels, and constructing a diversion facility on the Sacramento River. Land disposal of dredged material from channels in the Delta may substantially disturb or disrupt existing soils. Dredging impacts are discussed in Sections 5.3 and 6.2. Conversion of agricultural land is addressed in Section 7.1. During removal of diversion structures, accumulated sediments behind the diversion structure could be released into the stream system, causing increased sediment deposition downstream. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Protect exposed soils with mulches, geotextiles, and vegetative covers during and after construction activities in order to minimize soil loss.
2. Implement erosion control measures and bank stabilization projects.
3. Increase sediment deposition to mitigate erosion effects and provide substrate for new habitat by planting terrestrial and aquatic vegetation.
4. Re-use dredged materials to reduce or replace soil loss.
5. Prepare and implement best construction management plans.
6. Prepare and implement construction mitigation plans.
7. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
8. Use sediment curtains to contain turbidity plumes during dredging.

Impact 5. Potential changes in downstream geomorphology from enlarging existing storage facilities and other Program actions.

Expansion of existing storage facilities could increase downstream erosion capabilities and change downstream geomorphologic characteristics. This includes the reduction of stream bedload,

especially during high-flow events. Off-stream storage sites placed across minor drainages may diminish downstream flows and reduce sediment transport in local stream channels. Diversions of water to off-stream storage facilities could adversely affect downstream morphology by reducing the magnitude of channel forming flows.

During removal of diversion structures, accumulated sediments behind the diversion structure could be released into the stream system, causing increased sediment deposition downstream. Dredging impacts are discussed in Sections 5.3 and 6.2. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Increase sediment deposition and provide substrate for new habitat by planting terrestrial and aquatic vegetation.
2. Measure channel morphology over time to monitor changes and implement erosion control measures where needed.
3. Re-use dredged materials to reduce or replace soil loss.
4. Operate new storage facilities to minimize sediment trapping and increase sediment transport in rivers and tributaries.
5. Prepare and implement contingency plans for wetland and marshland restoration.
6. Modify storage facility operations to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream habitat.

Impact 6. Ground disturbance, inundation, seepage, and shoreline wind- and wave-generated erosion from new storage facilities and other Program actions.

Wind- and wave-generated erosion along the shoreline of new or expanded reservoirs could increase bank erosion and sedimentation at the site.

Construction of in-Delta storage facilities and associated diversion and conveyance components would result in local ground disturbances and inundation, the extent of which would depend on the type and size of storage, diversion and conveyance facilities constructed, construction methods, and sites selected.

Seepage to adjacent islands could be caused by groundwater underflow toward the tracts on the opposite banks on an in-Delta reservoir. Leakage could occur through the unlined canal transferring water from the diversion facility on the Sacramento River, waterlogging the soils along the alignment of the canal. Leakage could result in a significant adverse impact on water levels in soils adjacent to the canal. Seepage could also be caused by the flooding of Delta islands for habitat restoration and from altered levee vegetation management practices. Related seepage impacts to groundwater, agricultural land, and flood control are addressed in Sections 5.4, 7.1, and 7.8. A significant adverse impact of in-Delta storage would be the loss of prime farmland due to inundation at

the storage site. Agricultural land conversion impacts are discussed in Section 7.1. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Protect exposed soils with mulches, geotextiles, and vegetative ground covers during and after construction activities in order to minimize soil loss.
2. Implement erosion control measures and bank stabilization projects where needed.
3. Increase sediment deposition and provide substrate for new habitat by planting terrestrial and aquatic vegetation.
4. Prepare and implement best construction management plans.
5. Prepare and implement construction mitigation plans.
6. Control boat traffic in order to reduce boat wakes to levels that will not cause levee or bank erosion.
7. Design new levees and improve existing levees to withstand hydraulic stresses and seepage from flooding Delta islands.
8. Monitor water-level conditions on islands adjacent to in-Delta storage.
9. Install interception wells at in-Delta storage facilities to control seepage.
10. Control seepage through pumping and other appropriate measures.
11. Line conveyance canals to prevent seepage.

**Section 5.6 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts of Noise
Associated with the Preferred Program Alternative**

Impact 1. Increased noise from heavy equipment operation during construction.

Restoration projects, including, but not limited to installation of new fish screens at certain diversions in the Delta Region, wetland development and other habitat restoration efforts, and the Watershed Program, create construction-related noise and could impact residents, recreation users, and sensitive wildlife species. In addition, improving the existing levee systems and constructing new levees, as well as dredging, could result in increased construction-related noise levels. Modifying existing filtration plants; developing new pipelines, well fields, and pump stations; and new or modified pumps associated with increasing or decreasing pumping would create construction-related noise levels. Lastly, construction of new filtration and treatment facilities associated with the Water Quality Program would increase noise levels. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Use electrically powered equipment instead of internal combustion equipment where feasible.
2. Restrict the use of bells, whistles, alarms, and horns to safety warning purposes.
3. Design equipment to conform with local noise standards.
4. Locate equipment as far from sensitive receptors as possible.
5. Equip all construction vehicles and equipment with appropriate mufflers and air inlet silencers.
6. Restrict hours of construction to periods permitted by local ordinances.
7. Locate noisy equipment within suitable sound-absorbing enclosures.
8. Erect sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
9. Schedule construction activities to avoid breeding seasons of sensitive species and peak recreating use.
10. Conduct project-specific noise analyses for actions with noise impacts.

Impact 2. Noise from construction-related traffic along major access and haul routes and construction labor force vehicle traffic.

Noise levels could increase from construction-related traffic along major access and haul routes and construction labor force vehicle traffic. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Locate staging and stockpile areas, and supply and construction vehicle routes as far away from sensitive receptors as possible.
2. Establish and enforce construction site and haul road speed limits.
3. Restrict the use of bells, whistles, alarms, and horns to safety warning purposes.
4. Restrict hours of construction to periods permitted by local ordinances.
5. Schedule construction activities to avoid breeding seasons of sensitive species and peak recreating use.
6. Encourage use of public transportation and carpooling for construction workers.
7. Conduct project-specific noise analyses for actions with noise impacts.

Impact 3. Increased noise from facility operation of spillways, pumping generating plants, and switchyards.

Modifying existing filtration plants; developing new pipelines, well fields, and pump stations; and increasing or decreasing pumping would increase operations-related noise. Further, new pumps in storage conveyance systems would result in operations-related noise. Lastly, new filtration and treatment facilities associated with the Water Quality Program would increase operations-related noise. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Use electrically powered equipment instead of internal combustion equipment where feasible.
2. Restrict the use of bells, whistles, alarms, and horns to safety warning purposes.
3. Design equipment to conform with local noise standards.
4. Locate equipment as far from sensitive receptors as possible.
5. Locate noisy equipment within suitable sound-absorbing enclosures.
6. Erect sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
7. Conduct project-specific noise analyses for actions with noise impacts.

Impact 4. Increased noise from automobile or boat traffic associated with recreational use at enlarged reservoirs.

New off-stream and expansion of existing storage could provide additional recreation resources, which could result in an increase in noise from automobile and boat traffic. Transportation impacts are addressed in Section 5.7. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Erect sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
2. Restrict boating speeds or access to areas with sensitive receptors.
3. Conduct project-specific noise analyses for actions with noise impacts.

Impact 5. Increased traffic noise from permanently relocated roadways.

Roads may be closed or permanently relocated due to implementation of the Levee System Integrity Program and construction of storage and conveyance facilities, causing traffic to find an alternate route and increasing the traffic volume and congestion on the new route. Transportation impacts are addressed in Section 5.7. Traffic noise could increase where traffic is redirected. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Erect sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
2. Locate redirected roadways away from sensitive receptors.
3. Conduct project-specific noise analyses for actions with noise impacts.

**Section 5.7 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Transportation
Associated with the Preferred Program Alternative**

Impact 1. Increasing local traffic flows as the public accesses recreational resources at new storage facilities.

New off-stream and expansion of existing storage could provide additional recreation resources, which could result in an increase in local traffic flows. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Expand public transportation resources and local roadways.
2. Locate roadways in areas with fewer conflicts.
3. Design roadways to avoid or minimize traffic congestion.

Impact 2. Changing traffic flows as roads are temporarily rerouted around construction sites.

Restoration activities associated with the Ecosystem Restoration Program, such as wetland development or habitat development on levees, could result in local, short-term changes in traffic flows. Roads that are on or near levees being improved could be affected by levee construction work, and traffic would need to be detoured during construction. During reservoir and facility construction, some roads may require improvement or relocation, and traffic diversion may be required. Detours also may be necessary when facilities intersect with roadways. Highway traffic may be temporarily detoured during construction of bridges or road segments. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Provide convenient and parallel detours to routes closed during construction.
2. Expand public transportation, roads, and highways.
3. Encourage use of public transportation and carpooling for construction workers.

Impact 3. Relocating or permanently closing roads.

Roads may be closed or permanently relocated due to implementation of the Levee System Integrity Program, causing traffic to find an alternate route and increasing the traffic volume and congestion on the new route. In addition, new storage facilities could require relocating some local roads. Possible road relocations and new bridges could involve the long-term rerouting of traffic. If a road was closed and no nearby detour was available, traffic would be rerouted altogether. Constructing a diversion facility could involve relocating several miles of local roads, relocating highways, and constructing new bridges. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Expand public transportation, roads, and highways.
2. Locate roadways in areas with fewer conflicts.
3. Design roadways to avoid or minimize traffic congestion.
4. Encourage use of public transportation and carpooling for construction workers.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 4. Delays and disruptions resulting from detouring traffic as new roadways and railroad bridges are constructed around storage and conveyance facilities.

New storage facilities could require constructing new roadways and railroad bridges. If the bridge construction takes place on a rail line, it would be necessary to temporarily divert train traffic or alter train schedules. Localized highway traffic impacts could occur if the use of the new roads and bridges directs travel through already congested areas. Reservoir projects would generate additional vehicular traffic on roadways serving project sites during the multi-year construction period. Construction-related traffic would include equipment and supply deliveries, concrete trucks, service vehicles, and construction worker traffic. Increased construction traffic would cause some delays but probably would not preclude the use of county roads. During reservoir and facility construction, some roads may require improvement or relocation, and traffic diversion may be required. Detours also may be necessary when facilities intersect with roadways. Detours could increase travel time and cause delay. If detours substantially affect traffic flows, a portion of the existing traffic could choose an alternate route, further affecting traffic volumes.

Constructing a diversion facility on the Sacramento River could involve relocating several miles of local roads and highways, and constructing new bridges. Traffic would need to be detoured during construction and relocation. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Provide convenient and parallel detours to routes closed during construction.
2. Allow trains to use existing tracks while bridges are being built.
3. Schedule construction at times and seasons to minimize delays.

Impact 5. Adding construction vehicles to existing traffic levels, especially on narrow, two-lane local roads with winding routes.

Dredging operations, levee improvements, storage and conveyance facility construction and other Program actions could substantially affect transportation by creating safety conflicts on roadways. The addition of construction vehicles to existing roadway traffic levels could affect vehicle safety in areas where congestion already exists or on narrow, two-lane local roads with winding routes. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Clearly mark roadway intersections with warnings where visibility is poor in the project vicinity.
2. Schedule construction at times and seasons to minimize conflicts.

Impact 6. Closing two-lane roads to one lane in order to facilitate roadway improvements or relocations associated with the Watershed Program.

Road improvements and deconstruction of roads in upper watershed areas could result in construction impacts on transportation. Traffic may be diverted during construction. If alternative routes are not available, the affected route could be closed to one traffic lane during construction. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Provide convenient and parallel detours to routes closed during construction.
2. Clearly mark roadway intersections with warnings where visibility is poor in the project vicinity.
3. Schedule construction at times and seasons that would minimize delays.

Impact 7. Impeding or blocking patrol or rescue boats in Delta channels where fish barriers and flow control structures are installed.

Fish barriers and flow control structures could interfere with emergency response efforts by impeding or blocking patrol or rescue boats. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Provide boat portage or a stationary jib crane.
2. Relocate boat launch facilities.
3. Relocate emergency access roads.

Impact 8. Creating safety conflicts by operating large, slow-moving dredging equipment on Delta waterways.

The operation of slow-moving dredging equipment on Delta waterways could create safety conflicts for recreational boaters and commercial or rescue craft. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Require contractors to follow appropriate state and federal safety protocols.
2. Coordinate dredging and safety precautions with state and local authorities.

**Section 5.8 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts On Air Quality
Associated with the Preferred Program Alternative**

Impact 1. Direct, short-term air pollutant emissions during construction activities.

Ecosystem Restoration Program activities including installation of new fish screens, wetland development and river channel improvements could cause construction-related air quality impacts. Improvement of existing levee systems and construction of new levees, subsidence reversal activities, and dredging would result in construction-related air quality impacts. Modification of existing filtration plants, development of new pipelines, well fields, and pump stations, and increased pumping activities could result in construction- and operations-related air quality impacts in agricultural and urban environments. Reservoir construction could release pollutants of concern (NO_x, CO, and PM₁₀) at levels exceeding ambient air quality standards for extended periods, thereby potentially contributing significantly to regional air quality degradation. Conveyance facility construction-related pollutants of concern (NO_x, CO, and PM₁₀) may exceed ambient air quality standards for short, intermittent periods during construction but are not expected to result in sufficient quantities to significantly contribute to regional air quality degradation. Air emissions from operation of diesel- and gasoline-powered equipment include O₃ precursors (non-methane organic gas, volatile organic compounds, and NO_x), PM₁₀, CO, and toxic air contaminants. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Set traffic limits on construction vehicles.
2. Maintain properly tuned equipment.
3. Limit the hours of operation or amount of equipment.
4. Regularly water construction sites to control levels of dust in the air.
5. Use soil stabilizers and dust suppressants on unpaved service roadways.
6. Conduct daily contained sweeping of paved surfaces.
7. Limit vehicle idling time.
8. Use alternatively fueled equipment.
9. Require selection of borrow sites that are closest to fill locations.
10. Implement construction practices that reduce generation of particulate matter.
11. Hydoseed and mulch exposed areas.
12. Encourage use of public transportation and carpooling for construction workers.

Impact 2. Fugitive emissions of wind-blown dust.

Temporary land fallowing from water transfers could increase wind erosion if no cover crop or crop residue remains over the topsoil. Increased cultivation from water transfers or improved irrigation efficiency may result in increases in fugitive dust. Fugitive dust emissions could also increase if water transfers or water use efficiency measures result in a shift to crops associated with a drier topsoil. Conversion of land for various Program actions could increase fugitive emissions of wind-blown dust if the land is left as unvegetated, fallowed land. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Regularly water construction sites to control levels of dust in the air.
2. Use soil stabilizers and dust suppressants on unpaved service roadways.
3. Conduct daily contained sweeping of paved surfaces.
4. Require selection of borrow sites that are closest to fill locations.
5. Implement construction practices that reduce generation of particulate matter.
6. Hydroseed and mulch exposed areas.
7. Use cultivation practices that minimize soil disturbance.

Impact 3. Emissions associated with prescribed burning programs.

Prescribed burning programs in the upper and lower watershed areas are potentially significant sources of O₃ precursor emissions and PM₁₀ emissions. If Federal land management agencies undertake new prescribed burning programs, the programs may require evaluation for compliance with EPA Clean Air Act conformity regulations. Continuation of existing prescribed burning programs normally would be exempt from CAA conformity requirements. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Coordinate prescribed burning programs with relevant air quality management agencies to ensure that the programs are accounted for in air quality management plans.
2. Implement prescribed burning during favorable weather conditions.

Impact 4. Emissions from increases in equipment use and cultivation, agricultural chemical use, and crop shifting and burning.

Increased farming from water transfers and improved water use efficiency and reliability could result in increased emissions from equipment use and cultivation, agricultural chemical use, and crop shifting and burning. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Maintain properly tuned equipment.
2. Limit the use of agricultural chemicals.
2. Implement alternatives to crop burning including tilling and shallow flooding.
3. Coordinate crop stubble burning with relevant air quality management agencies to ensure that the programs are accounted for in air quality management plans.

Impact 5. Emissions if land use changes lead to higher recreational uses.

Emissions may increase if CALFED Program actions lead to land use changes with increased recreational uses. CALFED Program actions are not expected to result in increased residential or commercial land uses. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Limit the hours of operation or amount of equipment.
2. Follow air basin management plans to avoid or minimize vehicle-related emissions.
3. Restrict the kinds of recreational vehicles or the times of operation for certain off-road vehicles on fallowed agricultural land to limit the amount of fugitive dust.

Impact 6. Emissions from use of fossil fuels or other energy resources associated with pressurized irrigation systems.

Increased use in the agricultural sector of pressurized irrigation systems could create a greater reliance on fossil fuels or other energy sources. The increase could adversely affect air quality either locally (with fossil fuels) or regionally if energy is provided from out-of-region facilities. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Maintain properly tuned equipment.
2. Limit the hours of operation or amount of equipment.
3. Use alternatively fueled equipment.

Impact 7. Indirect air quality impacts from increased power generation to meet Program energy consumption and changes in operation.

Energy use may increase as energy consuming components of the CALFED Program are constructed, implemented, and maintained. Changes in operation could also reduce the amount of hydroelectric power generated. To the extent that Program actions cause significant reduction in hydroelectric generation or increases in project energy consumption without offsetting reduction in other electrical loads, new capacity and energy needs to be obtained to meet the deficit. Because California currently has a shortage of peaking power capacity, new power plants may be needed. Indirect impacts on air quality may occur if new power plants are constructed and operated.

The CALFED Bay-Delta Program does not propose construction of new power plants as part of its Program actions, and thus any impacts would be indirect. The location, number, and type of new power plants is unknown, and will likely be built as a result of demand from a number of other sources. An analysis of impacts from construction impacts would therefore be speculative at this time, and cannot be assessed until project level environmental assessment is undertaken by the appropriate permitting agency at the time a new power plant is proposed.

The level of air quality impacts from new power plants will also depend on the location and type of additional generation, which is not known at this time. These indirect air quality impacts would be dispersed among various air basins, and the level of adverse impacts will depend on the type of plant and the location where they are constructed. Emissions from new generation would be subject to federal, state, and regional air quality requirements at the time they are proposed. Moreover, the California Energy Commission has the authority for permitting power plants that generate 50 MW or more, and as such, has the responsibility to mitigate any significant air quality impacts that remain after permitting requirements are imposed.

The Secretary finds that the indirect air quality emissions associated with any new power plants related to program actions will need to comply with applicable air quality requirements, and therefore are expected to be less than significant. However, to the extent that emissions impacts are not reduced to less than significant levels, the Secretary finds that the responsibility to mitigate these impacts are within the jurisdiction of the Energy Commission and regional air quality districts. Thus, the Energy Commission and these districts can and should adopt these and any necessary project-specific mitigation measures at the time a power plant project is proposed.

Mitigation Strategies:

1. Obtain power from non-emitting sources such as other hydro, solar, and wind sources. This can occur through construction of, or the use of incentives to construct non-emitting power plants. This approach is consistent with state and federal policies related to promoting use of renewable resource type generation as expressed in Public Utility Code Section 381(c) (part of what is commonly referred to as AB 1890) and Executive Order 12902.
2. Utilize the best available control technology for new power production facilities.

**Section 6.1 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts On Fisheries and Aquatic Ecosystems
Associated with the Preferred Program Alternative**

Impact 1. Increased non-native species abundance and distribution to levels detrimental to native species from reestablishment of aquatic areas.

Although shallow water environments will be constructed to provide habitat for native and other desirable fish species, colonization by non-native aquatic plants, such as *Egeria densa*, may alter the structure and reduce habitat value. Newly created habitat may increase the abundance and distribution of carp, inland silverside, or other non-native species that compete with or prey on native species and species with higher economic and social value (for example, chinook salmon, delta smelt, and striped bass). In addition, habitat created by levee setbacks may increase the abundance and distribution of carp, inland silverside, or other non-native species that compete or prey on native species and species with higher economic and social value (for example, chinook salmon, delta smelt, and striped bass). This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Control undesirable non-native species through measures such as prevention, education, information dissemination, management techniques, and eradication.
2. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, it is unclear that this impact can be mitigated to less than significant based on currently available information. The CALFED Agencies have committed to a comprehensive non-native species research and control program (NIS Program). CALFED provided initial funding for this effort to the U.S. Fish and Wildlife Service in 1998. A Strategic Plan for Managing Nonnative Invasive Species and an Implementation Plan are included in the Ecosystem Restoration Program Strategic Plan in Appendices D and E. The Strategic and Implementation Plans describe the mission and goals of the NIS Program control measures and research priorities. If it is found that control efforts are ineffective, and that restored shallow-water habitats do not provide net benefit to native species, shallow-water habitat restoration will be discontinued. Nevertheless, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 2. Blocked access to habitat and altered water quality and flow conditions from placement of barriers in the south Delta.

Barriers in the south Delta would partially block Old River, Grant Line Canal, and part of the Middle River. The barriers would diminish tidal flow, reduce connectivity to other Delta channels, and alter basic hydraulic features that affect sediment and nutrient movement, water quality conditions (for example, increased water temperature and decreased dissolved oxygen), and productivity. Water quality impacts are addressed in Section 5.3. Adverse species-specific impacts include entrainment, interruption of migration toward downstream habitats, and increased loss of planktonic organisms that are prey for many Delta species. Potentially affected species are juvenile chinook salmon, larval and juvenile delta smelt and striped bass, and juvenile splittail. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Create additional habitat for desired species, including increased aquatic area and structural diversity through construction of setback levees and channel islands.
2. Operate new and existing diversions to avoid and minimize effects on fish--avoid facility operations during periods of high species vulnerability.

Increased aquatic habitat area and structural diversity will promote the survivability of different life stages of aquatic species by providing more areas for species to hide, rest, and find food; by promoting greater diversity in aquatic organisms that Delta species feed on; and by reestablishing heating and cooling processes that approximate natural conditions. New and existing diversions can be timed to minimize their effects on aquatic species and can be designed to minimize entrainment through screening. The conclusion that this impact can be mitigated to less than significant is further supported by the Program's commitment to utilize an adaptive management approach for all stages of barrier design, construction, and operation in order to avoid or mitigate significant adverse impacts on fisheries and aquatic organisms. Real-time monitoring, focused studies and pilot projects will inform facility design and development of operational criteria. Implementation will occur in phases to permit new information gained from studies and monitoring to influence changes in facility design and operations. In addition, the MSCS framework will ensure that the Program avoids, minimizes, or compensates for impacts on special status species and habitats prior to or concurrent with implementation.

Impact 3. Altered natural ecosystem structure, removal of benthic communities, and creation of conditions that may damage habitat for desired species from dredging activities and other Program actions.

Levee reconstruction, dredging, and the installation of rock revetment could result in both short- and long-term adverse effects due to habitat encroachment and losses. Levee maintenance could remove tidal marsh communities and riparian vegetation. Dredging to enlarge channels increases channel depth and further alters the natural structural features of the channel. Dredging also removes benthic communities and mobilizes fine sediments. Dredging would adversely affect channel structure, productivity, water quality, and species habitat. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Implement BMPs, including a storm water pollution prevention plan, toxic materials control and spill response plan, and vegetation protection plan.
2. Limit construction activities to windows of minimal species vulnerability.
3. Create additional habitat for desired species, including increased aquatic area and structural diversity through construction of setback levees and channel islands.
4. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
5. Use sediment curtains to contain turbidity plumes during dredging.

These measures are designed to avoid or minimize any temporary turbidity caused by Program implementation, to ensure such turbidity is not toxic, and to minimize the contact between aquatic species and turbid waters. Creating new habitat and a more diverse habitat structure promotes long-term species survivability and offsets short-term and long-term habitat losses. In addition, the MSCS framework will ensure that the Program avoids, minimizes, or compensates for impacts on special status species and habitats prior to or concurrent with implementation.

Impact 4. Release of toxic substances into surface waters.

Waterside construction activities for the Levee System Integrity Program and Ecosystem Restoration Program could result in short-term effects on water quality if toxic substances contained in old levees or in channel sediments are released during waterside levee work or dredging. Dredging may expose mercury-laden sediments and may mobilize other toxic elements. Earth moving and dredging associated with construction of Delta facilities could result in releases of toxic substances. Disturbances to previously farmed soils could release residual agricultural pesticides, including organochlorinated pesticides, mercury, nutrients, and other chemicals that may adversely affect water

quality. Storing water in surface reservoirs may mobilize trace elements, particularly in the deeper parts of the reservoirs where dissolved oxygen concentrations may become depressed. Certain contaminants in sediments, such as mercury, could become available in the water column as a result of implementing the ERP. Under anaerobic conditions, such as after creating a wetland, mercury is methylated and thus mobilized in the water column. Methyl mercury in the water column would be available to fish and other members of the food chain. Fish and other aquatic organisms may bioaccumulate metals and pesticides in their tissues, resulting in reproductive dysfunction, morbidity, or death. Water quality impacts are addressed in Section 5.3. Public health impacts are addressed in Section 7.9. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Implement BMPs, including a storm water pollution prevention plan, toxic materials control and spill response plan, and vegetation protection plan.
2. Limit construction activities to windows of minimal species vulnerability.
3. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
4. Use sediment curtains to contain turbidity plumes during dredging.
5. Schedule ground disturbing construction during the dry season.
6. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
7. Identify and investigate issues regarding beneficial reuse of dredged material, including conducting core sampling and analysis of proposed dredged areas, and implement engineering solutions to avoid or prevent environmental exposure to toxic substances after dredging.
8. Cap exposed toxic sediments with clean clay/silt and protective gravel.
9. Locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.

These measures are designed to minimize disturbance of toxic substances in the water and exposure of aquatic species to toxic substances during construction of certain Program actions. CALFED-supported research on mercury in the Delta is already underway to improve scientific understanding of the relationships between mercury and the Bay-Delta ecosystem. The Program provided grant funding in 1997 for research into the effects of wetlands restoration on methyl mercury level that has yielded valuable information. In addition, the Program committed \$ 3.8 million for broad-based assessment of ecological and human health impacts of mercury in the Bay-Delta watershed. In addition, the CALFED Agencies have supported a wide range of research into environmental water quality that will yield information that may be useful in designing and mitigating Program actions.

Impact 5. Short-term disturbance of existing biological communities and species habitat, mobilized sediments, and input contaminants from construction activities.

Construction activities associated with habitat restoration, levee reconstruction, construction of the Watershed Program elements, and storage and conveyance facilities, could result in adverse impacts on all species, through disturbance of existing biological communities, mobilization of sediments, and input of contaminants. Conveyance construction activities include new intake facilities, flow control barriers, storage facilities in the Delta, and levee setbacks associated with enlarging the Mokelumne River channel for the diversion facility on the Sacramento River.

Substantial sediment input could degrade aquatic habitat conditions and bury fish eggs and less mobile organisms that serve as fish food. Elevated levels of turbidity (suspended particulate matter) may result when fine sediment is suspended in the water column. Turbidity may cause indirect harm, injury, or mortality to fish species in the vicinity and downstream of the project area. High turbidity concentration can cause fish mortality, reduce fish feeding efficiency, and decrease food availability. Water quality impacts are addressed further in Section 5.3. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Implement Best Management Practices, including a storm water pollution prevention plan, toxic materials control and spill response plan, and vegetation protection plan.
2. Limit construction activities to windows of minimal species vulnerability.
3. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
4. Use sediment curtains to contain turbidity plumes during dredging.
5. Schedule ground disturbing construction during the dry season.
6. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
7. Identify and investigate issues regarding beneficial reuse of dredged material, including conducting core sampling and analysis of proposed dredged areas, and implement engineering solutions to avoid or prevent environmental exposure to toxic substances after dredging.

These measures are designed to minimize temporary mobilization of sediments and contaminants caused by Program implementation, and to minimize contact between aquatic species and sediment- or contaminant-laden waters. As previously described, creating new habitat and a more diverse habitat structure promotes long-term species survivability and offsets short-term and long-term habitat losses. In addition, the MSCS framework will ensure that the Program avoids, minimizes, or compensates for impacts on special status species and habitats prior to or concurrent with implementation.

Impact 6. Reduced streamflow and Delta outflow, changed seasonal flow and water temperature variability from water supply management, and changes in salinity associated with several Program elements resulting in reduced habitat abundance, impaired species movement, and increased loss of fish to diversions.

Diversions to new or modified storage could reduce annual outflow and could affect species. Additional export could affect estuarine salinity, adversely affecting the distribution and abundance of some aquatic organisms. Changes in Delta outflow and channel flow could affect the distribution of fish species, increasing entrainment in CVP and SWP exports and other Delta diversions. Water transfers may affect seasonal flow variability and productivity, reducing habitat abundance, reducing transport and attraction flows, and increasing entrainment. Increased water use efficiency could alter the timing of reservoir releases inconsistent with species needs and could affect wetlands and riparian habitats dependent on agricultural inefficiencies. Improved water use efficiency also may reduce the contribution of wastewater to streams, affecting aquatic communities dependent on wastewater-augmented flows. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Operate new and existing diversions to avoid and minimize effects on fish--avoid facility operations during periods of high species vulnerability.
2. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.
3. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects on aquatic species due to water transfers. The criteria for future water transfer proposals include:
 - Transfers must not harm fish and wildlife resources and their habitats.

New and existing diversions can be timed to minimize their effects on aquatic species and can be designed to minimize entrainment through screening. Flexible operations for water supply system operations can also minimize potential flow and temperature impacts on aquatic species by timing releases to coincide with species needs and to approximate natural flow, temperature, and sediment and nutrient conditions. The criteria and objectives in the Water Transfer Program are expected to minimize adverse impacts associated with upstream water transfers. The conclusion that this impact can be mitigated to less than significant is further supported by the CALFED Program's commitment to utilize an adaptive management approach for all stages of storage and conveyance design, construction, and operation in order to avoid or mitigate significant adverse impacts on fisheries and aquatic organisms.

Impact 7. Increased entrainment loss of chinook salmon and other species from diversions to new off-stream and in-Delta storage.

Diversions to off-stream storage, depending on the timing relative to species occurrence, could increase entrainment loss and adversely affect species populations, including chinook salmon and steelhead. Significant adverse impacts may include increased predation associated with the fish screen facility, increased losses attributable to fish screen inefficiency, and increased losses of eggs and larvae of striped bass, splittail, American shad, and other species. Although the diversion into in-Delta storage would be screened, entrainment-related losses would occur, including predation, abrasion and impingement, and entrainment of fish at critical life stages and other aquatic organisms that cannot effectively be screened given the existing technology. Export of in-Delta storage discharged to Delta channels could result in adverse effects. Higher exports resulting from increased storage in the Delta could adversely affect the population abundance of Delta species through entrainment losses of winter-, spring-, and fall-run chinook salmon and adult delta smelt. In addition, increased exports would increase the magnitude of net reverse flow conditions in Old and Middle Rivers and possibly in the lower San Joaquin River. Net reverse flow conditions are counter to natural net flow conditions in Delta channels and could reduce productivity, impair species movement, and increase entrainment in Delta diversions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Operate new and existing diversions to avoid and minimize effects on fish-avoid facility operations during periods of high species vulnerability.
2. Locate the diversion points to avoid primary distribution of desired species.
3. Control predators in the diversion facility (screen bays) and modify diversion facility structure and operations to minimize predator habitat.
4. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.

Again, new and existing diversions can be timed to minimize their effects on aquatic species and can be designed to minimize entrainment through screening. Diversions can be located and designed to avoid or minimize predation. Flexible operations for water supply system operations can also minimize potential flow and temperature impacts on aquatic species by timing releases to coincide with species needs and to approximate natural flow, temperature, and sediment and nutrient conditions. The conclusion that this impact can be mitigated to less than significant is further supported by the CALFED Program's commitment to utilize an adaptive management approach for all stages of reservoir facility design, construction, and operation in order to avoid or mitigate significant adverse impacts on fisheries and aquatic organisms.

Impact 8. Reduced frequency and magnitude of net natural flow conditions in the south and central Delta from Delta Cross Channel operations and south Delta barriers resulting in reduced system productivity, impaired species movement, and increased losses to diversions.

If the diversion facility on the Sacramento River is not constructed, additional closure of the Delta Cross Channel (DCC) may increase the frequency and magnitude of net reverse flow conditions in the lower San Joaquin River. If net reverse flows are worsened, the reduced frequency of natural net flow conditions in Delta channels could reduce productivity, impair species movement, and increase entrainment in Delta diversions. Species adversely affected could include delta smelt, striped bass, and American shad.

Closure of the south Delta barriers, without a concomitant reduction in exports, would increase net flow toward the CVP and SWP south Delta export intakes, primarily through Turner Cut, Middle River, and Old River. Enlarging Old River north of Clifton Court Forebay will increase SWP pumping capacity, which in turn may increase the magnitude of net reverse flow conditions in Old and Middle Rivers, and possibly the lower San Joaquin River. This counters natural net flow conditions and could reduce productivity, impair species movement, and increase entrainment in the Delta diversions. Species adversely affected could include chinook salmon, steelhead, delta smelt, striped bass, and American shad. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Operate new and existing diversions to avoid and minimize effects on fish—avoid facility operations during periods of high species vulnerability.
2. Coordinate and maximize water supply system flexibility consistent with seasonal flow and water temperature needs of desired species.

New and existing diversions can be timed to minimize the degree of change in flow conditions and can be designed to minimize entrainment through screening. Flexible operations for water supply system operations can also minimize potential flow and temperature impacts on aquatic species by timing releases to coincide with species needs and to approximate natural flow, temperature, and sediment and nutrient conditions.

The conclusion that this impact can be mitigated to less than significant is further supported by the CALFED Program's commitment to utilize an adaptive management approach for all stages of DCC and south Delta barrier operation in order to avoid or mitigate significant adverse impacts on fisheries and aquatic organisms.

Impact 9. Reduced net flow conditions in the Sacramento River downstream of the diversion facility on the Sacramento River.

The diversion of additional Sacramento River water would reduce the magnitude of natural net channel flow in the Sacramento River below the diversion, primarily during February to June. Existing relationships indicate that the diversion would reduce flow in the Sacramento River and would cause an increase in the proportion of flow entering Georgiana Slough. The proportion of juveniles moving from the Sacramento River into the Georgiana Slough, therefore, is expected to increase with the increased flow diverted to the Mokelumne River channel. Survival of chinook salmon that move into the DCC and Georgiana Slough is less than the survival of fishes that continue down the Sacramento River toward Rio Vista. The actual magnitude of survival is uncertain and depends on water temperature, flow, and salinity. The diversion increases the potential to shift X2 (an indicator of the entrapment zone) upstream by reducing net Sacramento River flow. This could reduce habitat quality and quantity for organisms associated with X2. The effects of reduced flow in the Sacramento River below the diversion could adversely affect habitat conditions and reduce the survival of chinook salmon, striped bass, and other species. The minimum flow criteria at Rio Vista and the diversion facility operations criteria would reduce adverse effects. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Operate new and existing diversions to avoid and minimize effects on fish; avoid facility operations during periods of high species vulnerability.
2. Construct a barrier to fish movement on Georgiana Slough.
3. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.

New and existing diversions can be timed to minimize the degree of change in flow conditions and can be designed to minimize entrainment through screening. Flexible operations for water supply system operations can also minimize potential flow and temperature impacts on aquatic species by timing releases to coincide with species needs and to approximate natural flow, temperature, and sediment and nutrient conditions. A barrier to fish movement on Georgiana Slough could increase species survival by keeping more fish in the Sacramento River during outmigration, where species survival is expected to be somewhat higher than in Georgiana Slough.

The conclusion that this impact can be mitigated to less than significant is further supported by the Program's commitment to utilize an adaptive management approach for all stages of diversion facility design, construction, and operation. Construction and operation of the diversion facility on the Sacramento River is contingent upon the avoidance or mitigation of significant, adverse impacts on fish

populations. For example, focused studies to better understand the effects on the survival of fishes downstream of the diversion will precede implementation.

Impact 10. Increased fish mortality through abrasion, increased predation, and other factors from the new fish screen facility for the diversion facility on the Sacramento River.

Operation of the diversion facility would increase juvenile salmon movement from the Sacramento River into the Mokelumne River channels, reducing their survival. In addition, abrasion, increased predation, impingement on fish screens, stress from being handled, and movement to inappropriate habitat would reduce the survival fish contacting the fish screens. The diversion could adversely affect winter-, spring-, late-fall-, and fall-run chinook salmon and possibly other species (for example, steelhead, splittail, striped bass, and American shad). This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Operate new and existing diversions to avoid and minimize effects on fish; avoid facility operations during periods of high species vulnerability.
2. Control predators in the diversion facility (screen bays) and modify diversion facility structure and operations to minimize predator habitat.
3. Construct a barrier to fish movement on Georgiana Slough.
4. Coordinate and maximize water supply system flexibility consistent with seasonal flow and water temperature needs of desired species.

New and existing diversions can be timed to minimize the degree of change in flow conditions and can be designed to minimize entrainment through screening. Flexible operations for water supply system operations can also minimize potential flow and temperature impacts on aquatic species by timing releases to coincide with species needs and to approximate natural flow, temperature, and sediment and nutrient conditions. A barrier to fish movement on Georgiana Slough could increase species survival by keeping more fish in the Sacramento River during outmigration, where species survival is expected to be somewhat higher than in Georgiana Slough.

The conclusion that this impact can be mitigated to less than significant is further supported by the Program's commitment to utilize an adaptive management approach for all stages of diversion facility design, construction, and operation. Construction and operation of the diversion facility on the Sacramento River is contingent upon the avoidance or mitigation of significant, adverse impacts on fish populations. For example, focused studies to better understand the effects of fish screens will precede implementation.

Impact 11. Delayed migration and reduced spawning success for adult fish moving from the Mokelumne River channels into the Sacramento River from fish screens and a diversion facility on the Sacramento River.

Some level of migration delay and blockage is likely if new channels are constructed and the Mokelumne River channel is enlarged as part of the diversion facility on the Sacramento River. This could affect populations of fishes, including chinook salmon, steelhead, splittail, delta smelt, striped bass, sturgeon, and American shad. Impacts may include mortality, reduced fecundity or reproductive success, and straying and could affect the fitness of natural spawning and rearing populations. The addition of Sacramento River flow to the Mokelumne River channels could confuse adult chinook salmon returning to the Mokelumne River to spawn and could delay outmigration of juveniles to the ocean. Although available information has not indicated responses of adult and juvenile chinook salmon to flow changes in the Mokelumne River channels, reduced survival of adults and juveniles could adversely affect the Mokelumne River chinook salmon populations. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Operate new and existing diversions to avoid and minimize effects on fish—avoid facility operations during periods of high species vulnerability.

New and existing diversions can be timed to minimize the degree of change in flow conditions and can be designed to minimize entrainment through screening.

The conclusion that this impact can be mitigated to less than significant is further supported by the Program's commitment to utilize an adaptive management approach for all stages of diversion facility design, construction, and operation. Construction and operation of the diversion facility on the Sacramento River is contingent upon the avoidance or mitigation of significant, adverse impacts on fish populations. For example, focused studies to better understand the effects of Program actions on the migration of adult and juvenile chinook salmon will precede implementation. These studies are identified as critical components of Stage 1 research.

**Section 6.2 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts On Vegetation and Wildlife
Associated with the Preferred Program Alternative**

Impact 1. Temporary and permanent loss and degradation of wetland, riparian and other natural communities.

Some permanent loss and degradation of various habitats, such as wetlands, riparian, annual grasslands, chaparral, woodland, and forest communities may result from inundation, land conversion, and other actions associated with the ERP, Levee Program, Water Use Efficiency Program, Water Transfer Program, and Conveyance and Storage elements.

Permanent impacts primarily would result from conversion of existing habitats to different habitat types and changes in land management practices (for example, changes in cropping patterns on agricultural lands or vegetation management practices). While most habitat restoration acreage would be created by restoring existing agricultural lands to natural habitats, a relatively small amount of some natural plant communities would be converted to open-water or other natural plant communities.

Dredging, levee rehabilitation and constructing setback levees could result in the disturbance and loss of wetland, riparian, grassland, and ruderal habitats. Water Use Efficiency Program measures could result in temporary losses or degradation of wetland and riparian communities (for example, from land grading and construction activities adjacent to habitat areas).

An in-Delta storage facility could remove or disturb existing emergent wetland, riparian, grassland, and ruderal habitat on affected islands. Surface storage reservoirs and associated facilities (for example, conveyance facilities to and from off-stream storage facilities) could inundate wetland, riparian, annual grassland, chaparral, woodland, and forest communities in the San Joaquin River and the Sacramento River Regions. Conveyance actions including construction of the south Delta flow and stage control facilities, the intertie, and the diversion facility on the Sacramento River could result in the temporary or permanent loss of wetland, riparian, grassland, and agricultural habitat types.

Degradation may occur indirectly from various program actions, such as increased recreation on land adjacent to new surface reservoirs and construction noise and human activity. Degradation may also occur indirectly from water quality impacts. Water quality impacts are addressed in Section 5.3. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Avoid direct or indirect disturbance to wetland and riparian communities, special-status species habitat, rare natural communities, significant natural areas, and other sensitive habitat.

2. Design Program features to permit on-site mitigation or nearby restoration of wetland, riparian habitat, special-status species habitat, rare natural communities, and significant natural areas that have been removed by permanent facilities.
3. Restore and enhance sufficient in-kind wetland and riparian habitat or rare natural communities and significant natural areas at offsite locations (near project sites) before or at the time that project impacts are incurred. Replace not only acreage lost, but also habitat value loss.
4. Restore wetland and riparian communities, special-status species habitat, and wildlife use areas temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.
5. Phase the implementation of Ecosystem Restoration Program habitat restoration to offset temporary habitat losses and to restore habitat (including special-status species habitat) before, or at the same time that, project impacts associated with the Ecosystem Restoration Program are incurred.
6. Maintain sufficient outflow downstream of constructed off-stream reservoirs to maintain existing downstream wetland riparian communities.
7. Manage recreation-related activities on lands managed under the Program to reduce or avoid impacts on sensitive habitat, important wildlife use areas, and special-status species.
8. Avoid creating wetlands in areas with high concentrations of mercury in sediments.

This conclusion is further supported by the adaptive management approach to ecosystem restoration contained in the ERP. Many ERP Stage 1 actions are designed to develop a better understanding of factors that influence the success of habitat creation and restoration efforts and the ensuing benefits to species. These Stage 1 actions, as outlined in the ERP Strategic Plan, Attachment D, are therefore expected to improve the likelihood that the foregoing mitigation strategies will be successful when implemented.

Impact 2. Substantial temporary or permanent loss and disturbance of wintering waterfowl foraging habitat.

Restoration of floodplain habitats could result in the loss of agricultural lands adjacent to streams and rivers and could reduce foraging habitat area for wintering waterfowl. The loss of agricultural lands that provide high wildlife forage values could result in a reduction in available forage for such species as Swainson's hawks, greater sandhill cranes, and wintering waterfowl, if natural and agricultural habitats restored or enhanced under the program provide less forage than is provided by the affected agricultural lands. Changes in agricultural practices from the Water Quality Program could result in a loss of habitat for some wildlife that use agricultural lands (for example, wintering waterfowl) if such changes reduce the amount or availability of forage on affected lands. Under the Water Use Efficiency Program, changes in cropping patterns, depending on the location and types of cropland that

would be affected, could result in a reduction in the quantity or quality of forage for wintering waterfowl, Swainson's hawks, and greater sandhill cranes. Under the Levee System Integrity Program, temporary and permanent losses of levee and adjacent habitats would reduce available habitat for associated plant and wildlife species, including wintering waterfowl. Land that provides habitat for wintering waterfowl may be permanently lost by Storage and Conveyance actions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Restore or enhance sufficient waterfowl foraging habitat near existing use areas to offset impacts on the abundance, quality, and availability of waterfowl forage. Restoration and enhancement actions include restoring and managing seasonal wetlands for wintering waterfowl, producing crops with high forage value (such as corn and rice), and modifying farming practices to increase forage availability (for example, leaving portions of forage crops unharvested through winter or shallowly flooding fields).
2. Phase the ERP to initially restore natural waterfowl foraging habitat on agricultural lands with low forage value while restored habitat with high forage value develops.
3. Phase the ERP to initially restore wetland habitat with high forage value to offset the loss of agricultural foraging habitat that may result from the ERP.

Impact 3. Substantial decrease in important upland wildlife habitat and use areas.

New off-stream or modified existing surface storage reservoirs and associated facilities (for example, conveyance facilities to and from off-stream storage facilities) could inundate or degrade important upland wildlife habitat and use areas, depending on where facilities are located and specific project design. Storage facility-related construction activities could cause short-term degradation and loss of important upland wildlife habitat and use areas. Degradation of important upland wildlife habitat and use areas may occur indirectly from various program actions, such as increased recreation on land adjacent to new or expanded surface reservoirs and construction noise and human activity associated with various CALFED Program actions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Avoid important wildlife habitat areas, such as critical deer winter range and fawning habitat.

2. Restore and enhance important wildlife habitat use areas temporarily disturbed by on-site construction activities by planting and maintaining native species immediately following construction.
3. Restore and enhance upland habitat areas within affected watersheds or in other watersheds if sufficient habitat enhancement is unavailable within the affected watershed. This could include modifying existing land management practices (for example, grazing and fire management practices) to improve conditions for the natural reestablishment and long-term maintenance of affected plant communities and habitats.
4. Avoid construction or maintenance activities within or near occupied special-status species habitat areas or important wildlife use areas when species may be sensitive to disturbance, such as during the breeding season.
5. Restore and enhance suitable habitat areas that are occupied by, or are near and accessible to, special-status species that have been adversely affected by the permanent removal of occupied habitat areas.
6. Manage recreation-related activities on lands managed under the Program to minimize or avoid potential adverse effects of recreation-related activities on sensitive habitats, important wildlife use areas, and special-status species.

Impact 4. Temporary and permanent fragmentation of riparian habitats and/or wildlife movement corridors.

Various types of levee upgrade designs could result in temporary or permanent fragmentation of existing riparian corridors that provide cover for some species during migration or local movements. Implementing the ERP could cause fragmentation of wetland, riparian, and agricultural wildlife foraging habitats.

New or modified existing surface storage reservoirs and associated facilities (for example, conveyance facilities to and from off-stream storage facilities) could fragment riparian corridors and disrupt historical movement patterns of some wildlife, depending on where facilities are located and specific project design. This impact is considered significant.

Implementation of the following mitigation strategies will reduce the impact caused by the levee improvements and the Ecosystem Restoration Program to less than significant. Implementation of the following mitigation strategies will reduce the impact caused by the Storage element.

Mitigation Strategies:

1. Avoid direct or indirect disturbance to wetland and riparian habitats and other sensitive habitat.
2. Restore riparian vegetation disturbed by on-site construction activities immediately following construction.

3. Restore or enhance sufficient in-kind riparian habitat at off-site locations, near project sites, in a manner that reduces the degree of existing habitat fragmentation before, or when, project impacts are incurred to offset habitat losses.
4. Restore habitat temporarily disturbed by on-site construction activities immediately following construction.
5. Phase the implementation of the Ecosystem Restoration Program habitat restoration to offset temporary habitat losses and to restore habitat before, or at the same time that, project impacts associated with the ERP are incurred.
6. Phase the implementation of modifications to levees that would be necessary to meet PL 84-99 standards in order to minimize the effects of fragmentation of riparian habitats and associated wildlife.
7. Avoid important wildlife habitat areas, such as critical deer winter range and fawning habitat.
8. Restore and enhance upland habitat areas within affected watersheds, or in other watersheds if sufficient habitat enhancement is unavailable within the affected watershed.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear whether the impact from construction of new or modified storage can be mitigated to less than significant. Depending on where storage facilities are located and specific project design, avoiding or mitigating permanent fragmentation of riparian habitats and/or wildlife movement corridors may not be feasible. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 5. Temporary or permanent loss of habitat or direct impacts on special-status species.

Implementation of the ERP could cause temporary impacts on special-status species and their habitats. Permanent impacts of implementing the ERP on special-status species and their habitats primarily would result from conversion of existing habitats to different habitat types and changes in land management practices (for example, changes in cropping patterns on agricultural lands or vegetation management practices). While most habitat restoration acreage would be created by restoring existing agricultural lands to natural habitats, a relatively small amount of some natural plant communities would be converted to open-water or other natural plant communities. Construction and habitat management related activities of the ERP and Watershed Program could result in temporary disturbance to, or mortality of, special-status species that may be present on or near areas where ERP and Watershed Program measures are implemented. Methylation of mercury in restored shallow-water habitats could impact fish and other members of the food chain, including special-status species.

Permanent impacts from the Watershed Program could include the loss of occupied special-status species habitat as a result of converting existing habitat to a different habitat type.

Construction and levee management related activities could result in temporary disturbance to or mortality of special-status species that may be present or near where CALFED Program actions are

implemented. Removal of grassland, wetland and agricultural land adjacent to existing levees to increase the land base of levees reduces the availability in these habitat areas for associated plant and wildlife species, including special-status species.

Changes in agricultural practices from the Water Quality Program could result in a loss of habitat for some wildlife, including special-status species, that use agricultural lands (for example, wintering waterfowl) if such changes reduce the amount or availability of forage on affected lands. Water Quality Program measures that result in ground disturbance, such as relocating water intakes, could cause localized and temporary disturbances to habitats and associated vegetation and wildlife, including special-status species, in some locations.

Construction-related Water Use Efficiency activities could result in disturbance to special-status species present or near where program actions are implemented. Some measures included in the Water Use Efficiency Program could result in temporary and permanent losses of incidental wetland and riparian communities, adversely affecting wildlife, including special-status species.

Water transfers could locally reduce the availability of habitat for special-status species.

Construction of storage facilities could impact special-status plants and animals as a result of construction-related activities and inundation of existing habitats, depending on where facilities are located and specific project design.

South Delta modification construction-related activities and operation of barriers could result in disturbance to or mortality of special-status species and loss or degradation of their habitats. In addition, construction of the intertie and a diversion facility on the Sacramento River could result in disturbance to or mortality of special-status species and loss or degradation of their habitats. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Avoid direct or indirect disturbance to areas occupied by special-status species.
2. Design program features to permit on-site mitigation or nearby restoration of wetland, riparian habitat and special-status species habitat that have been removed by permanent facilities.
3. Restore and enhance in-kind wetland and riparian habitat or rare natural communities and significant natural areas at offsite locations before or at the time that project impacts are incurred.
4. Restore wetland and riparian communities and special-status species habitat temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.
5. Phase the implementation of Ecosystem Restoration Program habitat restoration to offset temporary habitat losses and to restore habitat (including special-status species habitat) before, or at the same time that, project impacts associated with the ERP are incurred.

6. Restore and enhance suitable habitat areas that are occupied by, or are near and accessible to, special-status species that have been affected by the permanent removal of occupied habitat areas.
7. Phase habitat restoration actions to restore sufficient suitable habitat to minimize the adverse effects of impacts on occupied special-status species habitats before impacts are incurred.
8. Avoid construction or maintenance activities within or near habitat areas occupied by special-status wildlife species during the breeding season or other periods when species may be sensitive to disturbance.
9. Establish additional populations of special-status species in protected suitable habitat elsewhere within their historical range for species for which relocation or artificial propagation is feasible.
10. Provide incentives to alter agricultural practices to improve habitat conditions for affected special-status species that use agricultural lands. This could include planting and managing crops to increase the availability or quantity of forage for affected species.
11. Manage recreation-related activities on lands managed under the Program to reduce or avoid impacts on sensitive habitats and special-status species.
12. Avoid creating wetlands in areas with mercury in sediments and anaerobic conditions.

The conclusion that this impact can be mitigated to less than significant is further supported by implementation of the Multi-Species Conservation Strategy (MSCS). The MSCS framework will ensure that the Program avoids, minimizes, or compensates for impacts on special status species prior to or concurrent with implementation. More detailed measures to avoid direct impacts on special - status species are included in MSCS Attachments D and E and refine the programmatic avoidance mitigation strategy listed above, including:

- Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
- To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.
- To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from the inundation area of new storage reservoirs to suitable nearby habitat areas.
- Conduct surveys to determine the presence and distribution of [species] in suitable habitat before implementing CALFED actions that could result in the loss or degradation of habitat.

Impact 6. Loss of portions of rare natural communities and significant natural areas.

Permanent impacts of implementing the ERP on rare natural communities and significant natural areas could result from conversion of existing habitats to different habitat types and changes in land management practices (for example, changes in cropping patterns on agricultural lands or vegetation management practices). While most habitat restoration acreage would be created by restoring existing

agricultural lands to natural habitats, a relatively small amount of some natural plant communities would be converted to open-water or other natural plant communities. In addition, Watershed Program activities could result in temporary or permanent losses of natural habitats, including rare natural communities and significant areas.

Finally, the loss of portions of rare natural communities and significant natural areas may result from the construction of Storage and Conveyance facilities, depending on where facilities are located and specific project design. This impact is considered significant.

Implementation of the following mitigation strategies will reduce the impact caused by the Watershed Program and the Ecosystem Restoration Program to less than significant. Implementation of the following mitigation strategies will reduce the impact caused by the Storage element.

Mitigation Strategies.

1. Avoid direct or indirect disturbance to rare natural communities, significant natural areas, and other sensitive habitat.
2. Design program features to permit on-site mitigation or nearby restoration of wetland, riparian habitat, special-status species habitat, rare natural communities, and significant natural areas that have been removed by permanent facilities.
3. Restore and enhance in-kind wetland and riparian habitat or rare natural communities and significant natural areas at offsite locations before or at the time that project impacts are incurred.
4. Restore rare natural communities, significant natural areas, and wildlife use areas temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.
5. For species for which relocation or artificial propagation is feasible, establish additional populations of special-status species adversely affected by the Program in suitable habitat areas elsewhere within their historical range.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear whether the Storage impact can be mitigated to less than significant. Depending on where storage facilities are located and specific project design, avoiding impacts on rare natural communities and significant natural areas may not be feasible. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 7. Temporary disturbance or mortality of special-status species due to construction and habitat management activities.

Implementation of the ERP could cause temporary impacts on special-status species and their habitats. Construction and habitat management related activities of the ERP and Watershed Program could result in temporary disturbance to, or mortality of, special-status species that may be present on or near areas where ERP and Watershed Program measures are implemented. Temporary impacts could include displacement of resident species, local erosion and siltation of nearby streams and waterways, and disturbance of resident species as a result of construction activities. Certain contaminants in sediments, such as mercury, could become available in the water column as a result of implementation. Methylation of mercury in restored shallow-water habitats could impact fish and other members of the food chain, including special-status species.

Construction and levee management-related activities could result in temporary disturbance to or mortality of special-status species. Removal of grassland, wetland and agricultural land adjacent to existing levees to increase the land base of levees could affect special-status species.

Water Quality Program measures that result in ground disturbance, such as relocating water intakes, could cause localized and temporary disturbances to habitats and associated vegetation and wildlife, including special-status species, in some locations.

Construction-related Water Use Efficiency activities could result in disturbance to special-status species present or near where program actions are implemented. Some measures included in the Water Use Efficiency Program could result in temporary and permanent losses of incidental wetland and riparian communities, adversely affecting wildlife, including special-status species.

Construction of storage facilities could result in significant impacts on special-status plants and animals as a result of construction-related activities and inundation of existing habitats, depending on where facilities are located.

South Delta modification construction-related activities and operation of barriers could result in disturbance to or mortality of special-status species and loss or degradation of their habitats. In addition, construction of the intertie and a diversion facility on the Sacramento River could result in disturbance to or mortality of special-status species and loss or degradation of their habitats. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Avoid direct or indirect disturbance to wetland and riparian communities, special-status species habitat, rare natural communities, significant natural areas, and other sensitive habitat.

2. Restore wetland and riparian communities, special-status species habitat, and wildlife use areas. temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling non-native plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.
3. Manage recreation-related activities on lands managed under the Program to reduce or avoid impacts on sensitive habitat, important wildlife use areas, and special-status species.
4. Implement BMPs such as avoiding disturbance to highly erodible soils and installing siltation barriers and detention basins to reduce the potential for siltation of nearby wetlands.

The conclusion that this impact can be mitigated to less than significant is further supported by implementation of the Multi-Species Conservation Strategy (MSCS). The MSCS framework will ensure that the Program avoids, minimizes, or compensates for impacts on special status species prior to or concurrent with implementation. More detailed measures to avoid direct impacts on special - status species are included in MSCS Attachments D and E and refine the programmatic avoidance mitigation strategy listed above, including:

- Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
- To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.
- To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from the inundation area of new storage reservoirs to suitable nearby habitat areas.
- Conduct surveys to determine the presence and distribution of species in suitable habitat before implementing CALFED actions that could result in the loss or degradation of habitat.

Impact 8. Permanent loss of incidental wetland and riparian habitats that depend on agricultural inefficiencies.

The Water Use Efficiency Program may result in permanent losses of incidental wetland and riparian communities on agricultural land (from reduced or lost flows, including on-farm flows and flows in district-level delivery canals). Increasing irrigation and drainage efficiencies could result in less water available to incidental habitats that depend on existing inefficiencies. Under the Water Use Efficiency Program, agricultural lands that provide relatively high wildlife habitat value could be reduced in some years if cropland is fallowed or could be permanently lost if converted to produce crops that provide lower wildlife values. Impacts to agricultural land are addressed in Section 7.1. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Restore or enhance in-kind wetland and riparian communities and wildlife use areas at off-site locations before, or at the time that, project impacts are incurred.

Impact 9. Reduction in quantity or quality of forage for species of concern.

Permanent impacts of the Ecosystem Restoration Program on vegetation and wildlife resources primarily would result from conversion of existing habitats to different habitat types and changes in land management practices (for example, changes in cropping patterns on agricultural lands or vegetation management practices). The loss of agricultural lands that provide high wildlife forage values could result in a reduction in available forage for such species as Swainson's hawks, greater sandhill cranes, and wintering waterfowl if natural and agricultural habitats restored under the program provide less forage than is provided by the affected agricultural lands. Setback levees along the North Fork of the Mokelumne River from I-5 to the San Joaquin River could result in the loss of agricultural habitat area. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Design program features to permit on-site mitigation of wetland, riparian, or other sensitive habitat.
2. Restore or enhance waterfowl foraging habitat near existing use areas.
3. Phase the Ecosystem Restoration Program to initially restore natural waterfowl foraging habitat on agricultural lands with low forage value while restored habitat with high forage value develops.
4. Phase the Ecosystem Restoration Program to initially restore wetland habitat with high forage value to offset the loss of agricultural foraging habitat that may result from the Ecosystem Restoration Program.
5. Provide incentives to alter agricultural practices to improve habitat conditions for affected species of concern that use agricultural land. This could include planting and managing crops to increase the availability or quantity of forage for affected species.

**Section 7.1 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Agricultural Land and Water Use
Associated with the Preferred Program Alternative**

Impact 1. Conversion of prime, statewide important, and unique farmlands to project uses.

The Ecosystem Restoration Program could convert up to approximately 152,000 acres of prime, statewide important and unique agricultural lands to other uses in the Delta, Sacramento River, and San Joaquin River Regions. The Water Quality Program could result in retirement of up to approximately 37,000 acres of agricultural land in the San Joaquin River Region as a measure to improve water quality in the Grasslands Subarea. The Levee System Integrity Program could convert up to approximately 35,000 acres of Delta Region farmland but provide greater protection to farmland from flooding and salinity intrusion. Agricultural lands, including prime, statewide important and unique farmlands, ranging from up to approximately 15,700 acres without a diversion facility on the Sacramento River to up to 19,500 with a facility, would be converted by storage and conveyance facilities. Water transfers may indirectly result in reduction of agricultural acreage. Finally, conversion may result if dredged spoils are permanently disposed of on agricultural lands. Water use is discussed in Sections 5.1 and 5.2. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Site and align Program features to avoid or minimize impacts on agriculture.
2. Restore existing degraded habitat as a priority before converting agricultural land.
3. Focus habitat restoration efforts on developing new habitat on public lands before converting agricultural land.
4. If public lands are not available for restoration efforts, focus restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).
5. Provide water supply reliability benefits to agricultural water users.
6. Support the California Farmland Conservancy Program in acquiring easements on agricultural land in order to prevent its conversion to urbanized uses and increase farm viability. Focus on lands in proximity to where any conversion impact takes place.
7. Use farmer-initiated and developed restoration and conservation projects as a means of reaching Program goals.
8. Retain water allocations from retired drainage-impaired lands within the existing water districts.
9. Support the testing and application of alternative crops to idled farmland (for example, agroforestry or energy crops).

10. Examine structural and nonstructural alternatives to achieve project goals in order to avoid impacts on agricultural land.
11. Where small parcels of land need to be acquired for waterside habitat, seek out points of land on islands where the ratio of levee miles to acres farmed is high.
12. Obtain easements on existing agricultural land for minor changes in agricultural practices (such as flooding rice fields after harvest) that would increase the value of the agricultural crop(s) to wildlife.
13. Include provisions in floodplain restoration efforts for compatible agricultural practices.
14. Purchase water for habitat purposes so that the same locality is not affected over the long term.
15. Use a planned or phased habitat development approach in concert with adaptive management.
16. Minimize the amount of water supply required to sustain habitat restoration acreage.
17. In implementing levee reconstruction measures, work with landowners to establish levee reconstruction methods that avoid or minimize the use of agricultural land.
18. Work with landowners to establish levee subsidence BMPs that avoid impacts on land use practices. Through adaptive management, further modify BMPs to reduce impacts on agricultural land.
19. Use rotational fallowing to reduce selenium drainage.
20. When it appears that land within an agricultural preserve may be acquired from a willing seller by a State CALFED agency for a public improvement as used in Government Code Section 51920, advise the Director of Conservation and the local governing body responsible for the administration of the preserve of the proposal.
21. Limit the number of acres that can be fallowed (in order to produce transferrable water) in a given area (district or county) or the amount of water that can be transferred from a given area.
22. Support assistance programs to aid local entities in developing and implementing groundwater management programs in water transfer source areas.
23. Dredged materials will be analyzed, dredged and handled in accordance with permit requirements. Permits will incorporate mitigation strategies identified in Section 5.3 to prevent release of contaminants of concern.
24. Utilize the criteria in the Water Transfer Program, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers. The criteria for future water transfer proposals include:
 - Water transfers must be voluntary.
 - Water market transactions must result in the transfer or exchange of water that truly increases the utility of the supply, not water that a transferor has never used or water that would have been legally available for downstream use in the absence of a transfer.
 - Water rights of all legal water users must not be impaired.
 - Transfers must not cause overdraft or degradation of groundwater basins, or impair correlative rights of overlying users.
 - Entities receiving transferred water should be required to show that they are making efficient use of existing water supplies.

- Water rights holders (whether districts or individuals) must play a strong role in determining whether water to which they have a right is transferred.
- The beneficial and adverse impacts on fiscal integrity of the districts and on the economy of agricultural communities in source and receiving areas cannot be ignored.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 2. Conflicts with local government plans and policies.

Conversion of prime, state-wide important, or unique farmland to other uses likely would conflict with many local or regional agricultural land use policies. It is likely that lands designated for agriculture in county and city general plans would be used for storage, conveyance, habitat, and levee purposes. Thus, inconsistency with these plans could result in a significant adverse impact on agricultural land use. It is likely that a substantial amount of the agricultural land that the various programs could convert would be enrolled in the California Land Conservation Act, known as the Williamson Act. While projects from both the ERP and the Levee System Integrity Program likely would be compatible with the Act, Williamson Act contracted lands may also be acquired for other Program purposes, such as storage and conveyance. The loss of Williamson Act-contracted land for any of these program purposes is considered a potentially significant impact. Storage facilities could conflict with local and regional plans regarding agricultural lands in the foothill or mountain areas in the Sacramento River Region. Some agricultural land, which could be classified as locally important or grazing lands, could be affected by the Storage Program elements. Development of storage facilities in the San Joaquin River Region could conflict with local and regional plans regarding agriculture. Water transfers could cause land use changes that are inconsistent with local agricultural objectives. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Implement features that are consistent with local and regional land use plans.
2. Involve all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits.
3. Advise the Director of Conservation and the local governing body responsible for the administration of the preserve of the proposal when it appears that land within an agricultural preserve may be

acquired from a willing seller by a State CALFED agency for a public improvement as used in Government Code Section 51920.

4. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 3. Conflicts with adjacent land uses.

Restoration of habitat adjacent to agricultural operations could cause compatibility issues. If adjacent habitats contained sensitive species, aerial spraying of farmlands could be constrained. Weeds or pest species could move from restored habitat lands to agricultural fields, while removal or eradication could be constrained. Levee System Integrity Program and Ecosystem Restoration Program measures may create incompatibilities with adjacent land uses due to construction-related and post-construction sedimentation and erosion.

Adjacent land use may be affected by groundwater seepage and soil waterlogging. In-Delta storage could increase hydraulic head at the storage site and cause substantial groundwater underflow toward the tracts on the opposite banks of the island storage. Leakage could occur through the unlined canal transferring water from the diversion facility on the Sacramento River, waterlogging the soils along the alignment of the canal. Seepage could also be caused by the flooding of Delta islands for habitat restoration and from altered levee vegetation management practices. Related seepage impacts to groundwater, soils, and flood control are addressed in Sections 5.4, 5.5, and 7.8.

Water use efficiency measures may indirectly affect agricultural land use by causing a shift to high-value crops. The Water Transfer Program could cause land use changes that are inconsistent with local agricultural objectives.

Groundwater storage projects in the Sacramento River and San Joaquin River Regions could affect adjacent agricultural operations. Particularly in dry years, groundwater level declines could occur as result of overpumping in storage facilities. In extreme cases, the use of wells on adjacent or nearby properties could be lost due to adverse groundwater quality or lower groundwater levels. Economic impacts are discussed in Section 7.2. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Develop buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.
2. Implement erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetation areas with native riparian plants and wet meadow grasses.
3. Protect exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.
4. Utilize the criteria in the Water Transfer Program, listed above under Impact 1, in conjunction with existing legal constraints on water transfers, to protect against adverse effects due to water transfers.
5. Implement seepage control measures.
6. Support local groundwater management planning that reduces overdraft and third-party impacts.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

**Section 7.4 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Urban Land Use
Associated with the Preferred Program Alternative**

Impact 1. Displacement of some existing commercial uses and residents from Program actions located in urban land use areas.

Ecosystem Restoration Program actions could displace some commercial uses and residents. In addition, developing new surface water storage or enlarging existing storage reservoirs could displace some commercial uses and residents. Finally, conveyance components such as channel widening and dredging could require relocation of some commercial uses and a few scattered residences. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Select and design program actions that minimize the displacement of existing residents.
2. Select and design Program actions that do not physically disrupt or divide established communities.
3. Provide relocation assistance to displaced persons or businesses.
4. Minimize the amount of permanent easement required for construction of facilities and consult with property owners to select easement locations that would lessen property disruption and fragmentation.

Impact 2. Physical disruption or division of established communities.

Ecosystem Restoration Program actions could physically disrupt or divide established communities. Developing new surface water storage or enlarging existing storage reservoirs could physically disrupt or divide established communities in the Delta, Bay, Sacramento River and San Joaquin River Regions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Select and design Program actions that minimize the displacement of existing residents.
2. Select and design Program actions that do not physically disrupt or divide established communities.

3. Select Program actions that are consistent with local and regional land use plans. This could include consulting and working with local jurisdictions affected by Program actions early in the planning and environmental review process.
4. Notify all affected persons (for example, residents, property owners, school officials, and business owners) in the project area of the construction plans and schedules. This could include arranging schedules for road detours with residents and businesses to maintain access to homes, schools, and businesses; as well as providing protection, relocation, or temporary disconnection of utility services.
5. Provide relocation assistance to displaced persons or businesses.
6. Minimize the amount of permanent easement required for construction of facilities and consult with property owners to select easement locations that would lessen property disruption and fragmentation.
7. Relocate roads and utilities prior to project construction to ensure continued access and utility service through the project area.
8. Prepare a detailed engineering and construction plan as part of the project design plans and specifications, and include procedures for rerouting and excavating, supporting, and filling areas around utility cables and pipes in this plan.
9. Verify utility locations through consultation with appropriate entities and field surveys (such as probing and pot-holing).
10. Reconnect disconnected cables and lines promptly.

Impact 3. Potential conflicts of habitat development and storage and conveyance facilities with general plan land use designations or zoning if located in urban use areas.

Ecosystem Restoration Program actions could conflict with city or county general plan designations and zoning. Developing new surface water storage or enlarging existing storage reservoirs could conflict with general plan designations and zoning in the Delta, Bay, Sacramento River and San Joaquin River Regions. Since the commitment to construct storage facilities at specific locations has not been made, consistency with local general plans will be analyzed prior to making a decision to construct on these sites. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Select Program actions that are consistent with local and regional plans.
2. Notify all affected persons (for example, residents, property owners, school officials, and business owners) in the project area of the construction plans and schedules.

**Section 7.6 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Utilities and Public Services
Associated with the Preferred Program Alternative**

Impact 1. Need for relocation or modification of major infrastructure components.

Some infrastructure, including electrical transmission lines, and substations, communication lines, natural gas lines, or water conveyance structures, may need to be relocated or modified as a result of Ecosystem Restoration Program actions. Implementation of the Water Quality Program could require the relocation of water supply intakes and conveyance structure. The Water Use Efficiency Program could require new distribution systems to provide increased levels of recycled water to potential customers. Modification or relocation of existing levees under the Levee System Integrity Program could require the displacement or modification of utility infrastructure, including natural gas and electric transmission lines and communication infrastructure. Construction of storage facilities could require the relocation or modification of natural gas, electric, and communication transmission lines and other major infrastructure. Construction of floodways, setback levees, intake structures, interties, and channel conveyance modifications for the diversion facility could require the relocation of natural gas and electric transmission lines, and communication infrastructure in the Delta Region. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Site project facilities and transmission infrastructure to avoid existing infrastructure.
2. Construct overpasses, small bridges, or other structures to accommodate existing infrastructure.
3. Design and operate facilities to minimize the amount of energy required and to maximize the amount of energy created.
4. Design project facilities to avoid or minimize their effect on existing infrastructure.

Impact 2. Increased risk of gas line rupture during construction.

Construction associated with the Levee System Integrity Program could increase the risk of gas line rupture, in particular to lines that cross exterior levees. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Coordinate construction activities with utility providers.
2. Design project facilities to avoid or minimize their effect on existing infrastructure.

**Section 7.7 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Recreation
Associated with the Preferred Program Alternative**

Impact 1. Temporary closure of recreation areas during construction.

During construction of Ecosystem Restoration Program and Levee System Integrity Program actions, some recreation areas or facilities may be temporarily closed to the public. Certain recreation facilities, such as piers or marinas, would be temporarily or permanently closed following restoration actions. Temporary, seasonal, or permanent closure of Delta waterways could affect boating access and circulation.

Activities associated with the Watershed Program could result in blocked access to or temporary closure of recreation areas.

A diversion facility on the Sacramento River and accompanying conveyance channel and channel modifications may result in temporary recreation impacts during construction. Some of these actions could permanently displace land-based recreation opportunities including camping, hiking, and picnicking.

Dredging could result in short-term construction impacts, such as obstructing or closing channels and creating noise and visual impacts. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Maintain boating access to prime areas.
3. Identify and mark alternate boating routes.
4. Provide public information regarding alternate access.
5. Avoid construction during peak-use seasons and times.
6. Post warning signs and buoys in channels.
7. Work with recreational interests to protect and enhance recreation resources.
8. Provide in-kind recreation facilities.
9. Provide or improve vehicle access and parking for recreation areas.
10. Provide access to waterfront areas and island edges.
11. Create new day-use boating and camping areas.
12. Conduct an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.
13. Restore and design existing and new levees to accommodate vehicular access and parking for shoreline fishing, boat launching, swimming, hiking, bicycling, and wildlife viewing whenever feasible.

Impact 2. Decrease in recreation opportunities and increases in boat traffic in some areas due to speed zone restrictions or prohibition of motorized boating in some areas.

Prohibition of motorized boating, short-term construction-related access restrictions, and speed restrictions to protect erosion-prone habitat and levees from boat wakes could alter personal watercraft and boat use and decrease the number of use-days for boating in the Delta. Boat traffic could increase in some areas as a result of these speed and access restrictions and from temporary and permanent closure of recreation facilities in other areas. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Maintain boating access to prime areas.
3. Identify and mark alternate boating routes.
4. Construct portage facilities.
5. Construct boat locks.
6. Provide public information regarding alternate access.
7. Avoid construction during peak-use seasons and times.
8. Post warning signs and buoys in channels.
9. Work with recreational interests to protect and enhance recreation resources.
10. Create new day-use boating and camping areas.
11. Conduct an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.

Impact 3. More stringent enforcement of boat discharges.

As a measure to protect water quality, the Ecosystem Restoration Program will provide additional funding to the agencies responsible for enforcing existing regulations on the discharge of boat septic systems. Since this action only involves enforcement of existing regulations, this impact is anticipated to be less than significant.

To the extent that this action may result in a minor impact, implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.

2. Work with recreational interests to protect and enhance recreation resources.
3. Relocate or construct new recreation facilities and infrastructure.

Impact 4. Temporary or permanent changes in boating access and navigation.

During construction of Ecosystem Restoration Program and Levee System Integrity Program actions, some recreation areas or facilities may be temporarily closed to the public. Certain recreation facilities, such as piers or marinas, would be temporarily or permanently closed following restoration actions. Temporary, seasonal, or permanent closure of Delta waterways could affect boating access and circulation. Prohibition of motorized boating and speed restrictions to protect newly restored habitats from boat wakes could alter personal watercraft and boat use and decrease the number of use-days for boating in the Delta.

Operating fish and flow control barriers in the south Delta could restrict boat access and navigation.

Changes in reservoir operations related to water transfers, water supply needs, or fish recovery could affect existing minimum pool levels and adversely affect recreational opportunities related to specific water surface elevations, including access to marinas and boat launching facilities. This impact is considered significant.

Implementation of the following mitigation strategies will reduce the temporary impact to less than significant. Implementation of the following mitigation strategies will reduce the permanent impact on boating access and navigation.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Maintain boating access to prime areas.
3. Identify and mark alternate boating routes.
4. Construct portage facilities.
5. Construct boat locks.
6. Provide public information regarding alternate access.
7. Avoid construction during peak-use seasons and times.
8. Post warning signs and buoys in channels.
9. Work with recreational interests to protect and enhance recreation resources.
10. Create new day-use boating and camping areas.
11. Conduct an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.

12. Restore and design existing and new levees to accommodate vehicular access and parking for shoreline fishing, boat launching, swimming, hiking, bicycling, and wildlife viewing whenever feasible.

The Secretary finds that while the mitigation strategies described above will substantially lessen the permanent impact on boating access and navigation, based on currently available information, it is unclear whether this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 5. Permanent closure of recreation facilities.

Ecosystem Restoration Program and Levee System Integrity Program actions could result in the temporary or permanent closure of certain recreation facilities, such as piers or marinas.

Operating fish and flow control barriers in the south Delta could restrict boat travel to marinas and fishing sites.

New or modified existing storage facilities could result in the permanent closure of recreation facilities.

A diversion facility on the Sacramento River and accompanying conveyance channel and channel modifications may result in the permanent displacement of land-based recreation opportunities including camping, hiking, and picnicking. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Maintain boating access to prime areas.
3. Work with recreational interests to protect and enhance recreation resources.
4. Relocate or construct new recreation facilities and infrastructure.
5. Provide or improve vehicle access and parking for recreation areas.
6. Create new day-use boating and camping areas.
7. Conduct an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.
8. Restore and design existing and new levees to accommodate vehicular access and parking for shoreline fishing, boat launching, swimming, hiking, bicycling, and wildlife viewing whenever feasible.

Impact 6. Potential decrease in flooded lands suitable for wildlife, hunting, and fishing as a result of water use efficiency actions.

Water Use Efficiency Program measures could reduce agricultural return flows and after-harvest flooding of fields. This could reduce the extent of waterfowl habitat and affect recreational hunting and bird watching. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Work with recreational interests to protect and enhance recreation resources.
3. Provide in-kind recreation facilities.
4. Relocate or construct new recreation facilities and infrastructure.
5. Purchase trail rights-of-way or recreational easements.

Impact 7. Reduced water-contact recreation quality from cold water reservoir releases.

Changes in reservoir operations resulting in increased cold-water flows could adversely affect water-contact recreation, such as swimming, tubing, canoeing, kayaking, rafting, windsurfing, and the use of personal watercraft, downstream of reservoirs. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Work with recreational interests to protect and enhance recreation resources.
3. Provide or improve vehicle access and parking for recreation areas.
4. Provide access to waterfront areas and island edges.
5. Create new day-use boating and camping areas.

Impact 8. Displacement of fish and wildlife and loss of terrestrial and loss of on-stream recreation from new off-stream or expanded on-stream reservoirs.

New or expanded storage facilities could impact existing recreation resources, including fishing, wildlife viewing, camping, and boating, due to inundation or other impacts related to construction.

Flooding of reservoir sites could displace fish and wildlife from existing recreation areas. This may result in increased usage of other recreational facilities in the area. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Work with recreational interests to protect and enhance recreation resources.
3. Purchase trail rights-of-way or recreational easements.
4. Provide or improve vehicle access and parking for recreation areas.
5. Create new day-use boating and camping areas.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear whether this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 9. Potential for reduced access to recreation facilities and decreased recreation opportunities from changes in reservoir levels.

Changes in reservoir operations related to water transfers, water supply needs, or fish recovery could affect existing minimum pool levels and adversely affect recreational opportunities related to specific water surface elevations, including access to marinas and boat launching facilities. Changes in reservoir levels could also decrease the quality of the recreational experience and could result in decreased visitation, affecting businesses. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Incorporate project-level recreation improvements and enhancements.
2. Work with recreational interests to protect and enhance recreation resources, given regulatory and other operational constraints.
3. Provide in-kind recreation facilities.
4. Maintain reservoir levels as high as feasible during the recreation season, given regulatory and other operational constraints.
5. Minimize water level fluctuation and establish minimum pool levels, given regulatory and other operational constraints.
6. Create new day-use boating and camping areas.

Impact 10. Potential short-term construction impacts of dredging, such as obstructing or closing channels and creating noise and visual impacts.

Dredging for levee improvement and conveyance actions could result in short-term construction impacts, such as obstructing or closing channels and creating noise and visual impacts. Noise and visual impacts are addressed in Sections 5.6 and 7.13. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Avoid construction during peak-use seasons and times.

**Section 7.8 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Flood Control
Associated with the Preferred Program Alternative**

Impact 1. Impacts on levee stability from levee and berm vegetation management practices for habitat purposes.

Reduced levee and berm vegetation management practices may result in significant and adverse long-term impacts on levee stability. Reduced pruning and clearing would allow more deep roots to penetrate levees and more dense vegetative canopies on levee surfaces. Dense vegetation could substantially reduce inspection capabilities by hiding rodent holes, cracks, or other potential causes of levee degradation. Thick understory vegetation also would limit access to levee side slopes, thereby reducing maintenance, repair, and emergency response capabilities. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Allow reasonable clearing of deep-rooted trees and shrubs from levee side slopes to support inspection, maintenance, repair, and emergency response, while preserving habitat values.
2. Permit clearing of deep-rooted shrubs and trees on levee side slopes. Trees and shrubs should be allowed to grow only on adjacent berms. If roots penetrate levees, fill materials should be added to levee landside slopes in order to construct a partial setback levee and increase stability.
3. Incorporate flood control criteria into the design of stream bank revegetation projects. For example, by increasing the width of vegetated sections to maintain conveyance capacity, the net effect of vegetation on flood control would be negligible.
4. Improve levees to withstand expected hydraulic stresses and seepage.

Impact 2. Reduced levee stability from habitat restoration using conservation easements along riparian corridors.

Habitat restoration using conservation easements along riparian corridors could reduce levee stability. Over time, deep-rooted and dense riparian trees and shrubs could increase the opportunity for roots to penetrate levees. Increased cracking and fissures could allow water to enter the levee interior, resulting in reduced structural stability. Small cracks, fissures, and root voids also could allow increased seepage beneath the levee, which could decrease levee stability. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Allow reasonable clearing of deep-rooted trees and shrubs from levee side slopes to support inspection, maintenance, repair, and emergency response, while preserving habitat values.
2. Permit clearing of deep-rooted shrubs and trees on levee side slopes. Trees and shrubs should be allowed to grow only on adjacent berms. If roots penetrate levees, fill materials should be added to levee landside slopes in order to construct a partial setback levee and increase stability.
3. Incorporate flood control criteria into the design of stream bank revegetation projects. For example, by increasing the width of vegetated sections to maintain conveyance capacity, the net effect of vegetation on flood control would be negligible.
4. Improve levees to withstand expected hydraulic stresses and seepage.

Impact 3. Increased seepage on adjacent islands, possibly leading to flooding from seepage-induced failure from shallow flooding of Delta islands susceptible to subsidence.

Shallow flooding of Delta islands susceptible to subsidence could significantly and adversely increase seepage on adjacent islands, and lead to substantial flooding from seepage-induced failure. In-Delta storage would increase hydraulic head at the storage site and may increase seepage on adjacent islands. In turn, this seepage may lead to piping and the loss of levee material, which could lead to levee instability. Related seepage impacts to groundwater, soils, and agricultural land are addressed in Sections 5.4, 5.5, and 7.1. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Identify locations susceptible to seepage-induced failure on Delta islands that may be intentionally flooded for habitat.
2. Implement a seepage monitoring program on nonflooded islands adjacent to potential shallow-flooded islands.
3. Develop seepage control performance standards to be used during island flooding and storage periods to determine net seepage caused by shallow flooding.
4. Improve levees to withstand expected hydraulic stresses and seepage.
5. Install relief wells near the toes of existing levees on neighboring lands.
6. Construct toe berms with an internal drainage system on neighboring lands.
7. Lower the pool elevation on the storage islands.
8. Develop wetland easements adjacent to levees on neighboring islands.

9. Construct a combination of seep and interior ditches and increase pumping rates, install clay blankets, and install impervious cutoff walls through storage island levees.

Impact 4. Increases in wind-fetched and wave erosion on landside levee slopes from island flooding.

Island flooding results in significant increases in wind-fetch and wave erosion on landside levee slopes. Waterside slopes also could experience significant erosion from increased wind-fetch and waves if the existing levees are not left intact. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Design erosion protection measures to minimize or eliminate wave splash and run-up erosion.
2. Use rip rap or another suitable means of slope protection to dissipate wave force.
3. Construct large wind/wave breaks in the flooded islands to reduce wind-fetch and erosion potential.
4. Control boat traffic in order to reduce boat wakes to levels that will not cause levee or bank erosion.
5. Coordinate erosion protection measures and wave force dissipation measures with the Ecosystem Restoration Program to minimize adverse impacts to revegetation efforts.

Impact 5. Increased levels of flooding downstream of diversions after removal of diversion structures and other obstructions to flow in the Sacramento River tributaries.

Removing diversion structures and other obstructions to flow in the Sacramento River tributaries could increase the level of flooding downstream of these diversions. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Widen streams downstream of removed water diversion structure to increase conveyance capacity.
2. Implement flood management measures including dredging, levee maintenance, and snag removal.

Impact 6. Increased flood stages along small streams due to increases in the roughness of the stream channel from vegetation on stream banks.

Reestablishing riparian habitat or preventing the removal of riparian vegetation would increase the roughness of the stream channel and could increase flood stages on smaller streams. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Incorporate flood control criteria into the design of stream bank revegetation projects. For example, by increasing the width of vegetated sections to maintain conveyance capacity, the net effect on flood control would be negligible.

Impact 7. Levee slumping and cracking caused by groundwater overdraft and subsidence.

Groundwater transfers or surface water transfers based on groundwater substitution could result in lower groundwater levels and land subsidence. If improperly managed, groundwater storage programs could result in significant adverse impacts associated with overdrafting the aquifer, including land subsidence. Water use efficiency measures may require more frequent water deliveries and could result in increased groundwater pumping and localized ground subsidence. Pumping and subsidence occurring near levees or other flood control facilities could cause settlement of the underlying substrate, resulting in levee slumping or cracking, or more significant damage. Third-party impacts are also discussed in Sections 7.2 and 7.14. Impacts on soils are addressed in Section 5.5. Groundwater impacts are addressed in Section 5.4. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Identify existing or planned wells that could affect groundwater and substrate conditions underlying nearby levees or flood control devices.
2. Support local groundwater management planning that reduces overdraft and third-party impacts.
3. Support local agencies in distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
4. Provide incentives to terminate use of wells that can adversely affect levee stability, reduce their pumping volume to safe withdrawal levels as they affect substrate stability, or otherwise replace them with sources that could not affect levee stability.

Impact 8. Increased stage upstream of and possible decreased stage downstream from gate structures located in channels that reduce the channel's flood flow conveyance.

Levee setbacks and removals associated with the conveyance element could result in two impacts. Lower water surface elevations could result in a steeper hydraulic gradient and higher flow velocities immediately upstream of the levee removal location. Lower water surface elevations could also change the flow distribution, possibly increasing the volume of water that discharges through adjacent channels. Gate structures located in channels could reduce the channel's flood flow conveyance, resulting in increased stage upstream of the structures and possibly decreased stage downstream. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Design structures to minimize the loss of channel conveyance at gate structures located in channels.
2. Implement flood management measures including dredging, levee maintenance, and snag removal.

**Section 7.11 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Cultural Resources
Associated with the Preferred Program Alternative**

Impact 1. Impacts on cultural resources from construction, excavation, fill and flooding.

Implementing the Ecosystem Restoration Program, including revegetation projects, improved fish passage, eradication of undesirable plant species, establishment of shallow water habitat, gravel replacement, new floodways, levee setbacks, and creating aquatic and wetland habitat, could impact cultural resources. Clearing or replanting vegetation, if not performed with hand tools, could adversely affect historic properties or important cultural resources located in areas to be cleared or restored.

Levee construction activities could affect cultural resources due to the extensive earth movement required and the proximity to water sources.

Activities associated with the Watershed Program, including minor construction and revegetation, could impact National Register of Historic Places-eligible properties, historic resources, or unique archeological resources. Vandalism and looting of artifacts could result from Watershed Program actions that increase access to locations where cultural resources are present.

Surface storage reservoirs and groundwater storage could result in major construction-related impacts and impacts associated with flooding certain tracts, acquiring land, and relocating certain facilities that may hold historic significance.

Earth moving associated with Conveyance actions, such as setting back levees, dredging and enlarging channels, or widening portions of the Mokelumne River, and the construction of the diversion facility and flow and stage control barriers, could affect cultural resources.

Dredging may increase the likelihood of encountering possible ship wrecks or other underwater cultural resource features. Disposal of dredged spoils could affect buried and surface archeological sites. This impact is considered significant.

Collectively, implementation of the following mitigation strategies will reduce the Program's impacts on cultural resources to less than significant. The appropriate mitigation for specific actions will be determined following project-specific evaluation and compliance. Federal actions must comply with the National Register of Historic Places (36 C.F.R. 800.16[I]). State actions must comply with the California Environmental Quality Act (Pub. Resources Code Sections 21084.1 and 21083.2; CEQA Guidelines Section 15064.5[a]).

Mitigation Strategies:

1. Conduct cultural resource inventories.
2. Avoid sites through project redesign.
3. Map sites prior to undertaking actions that affect cultural resources.
4. Conduct surface collections.
5. Perform test excavations.

6. Probe for potentially buried sites.
7. Prepare reports to document mitigation work.
8. Conduct full-scale excavation of sites slated for destruction as a result of projects.
9. Prepare public interpretive documents.
10. Document historic structures by preparing Historic Engineering Records or Historic American Building Surveys.
11. Conduct ethnographic studies for traditional cultural properties.

Impact 2. Alteration of the historic setting of a cultural resource.

Implementing the Ecosystem Restoration Program, including revegetation projects, improved fish passage, eradication of undesirable plant species, establishment of shallow water habitat, gravel replacement, new floodways, levee setbacks, and creating aquatic and wetland habitat, could impact cultural resources. Clearing or replanting vegetation, if not performed with hand tools, could adversely affect historic properties or important cultural resources located in areas to be cleared or restored.

Levee construction activities could affect cultural resources due to the extensive earth movement required and the proximity to water sources.

Activities associated with the Watershed Program, including minor construction and revegetation, could impact NRHP-eligible properties, historic resources, or unique archeological resources. Vandalism and looting of artifacts could result from Watershed Program actions that increase access to locations where cultural resources are present.

Surface storage reservoirs and groundwater storage could result in major construction-related impacts and impacts associated with flooding certain tracts, acquiring land, and relocating certain facilities that may hold historic significance.

Earth moving associated with Conveyance actions, such as setting back levees, dredging and enlarging channels, or widening portions of the Mokelumne River, and the construction of the diversion facility and flow and stage control barriers, could affect cultural resources.

Dredging may increase the likelihood of encountering possible ship wrecks or other underwater cultural resource features. Disposal of dredged spoils could affect buried and surface archeological sites. This impact is considered significant.

Collectively, implementation of the following mitigation strategies will reduce the Program's impacts on cultural resources to less than significant. The appropriate mitigation for specific actions will be determined following project-specific evaluation and compliance. Federal actions must comply with the National Register of Historic Places (36 C.F.R. 800.16[1]). State actions must comply with the California Environmental Quality Act (Pub. Resources Code Sections 21084.1 and 21083.2; CEQA Guidelines Section 15064.5[a]).

Mitigation Strategies:

1. Conduct cultural resource inventories.
2. Avoid sites through project redesign.
3. Map sites prior to undertaking actions that affect cultural resources.
4. Conduct surface collections.
5. Perform test excavations.
6. Probe for potentially buried sites.
7. Prepare reports to document mitigation work.
8. Conduct full-scale excavation of sites slated for destruction as a result of projects.
9. Prepare public interpretive documents.
10. Document historic structures by preparing Historic Engineering Records or Historic American Building Surveys.
11. Conduct ethnographic studies for traditional cultural properties.

**Section 7.12 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Public Health and Environmental Hazards
Associated with the Preferred Program Alternative**

Impact 1. Short- and long-term increases in mosquito breeding habitat from wetland restoration activities and fluctuating water levels.

Actions associated with the Ecosystem Restoration Program could increase the amount of mosquito breeding habitat in the Delta, Bay, Sacramento River, and San Joaquin River Regions. For example, expanding floodplains in the Delta could leave areas of standing shallow water when water levels decline, which would provide mosquito breeding grounds. Converting agricultural land to wetland and other habitat and seasonally flooding agricultural land also could increase standing water. Some levee reconstruction could create riparian and wetland habitat, resulting in permanent or temporary (during construction) standing water, in turn increasing mosquito breeding habitat.

Channel widening, island flooding, and water project operation changes resulting in fluctuating water levels associated with storage and conveyance actions could create pockets of standing water that could provide mosquito breeding habitat. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Use various mosquito control methods, such as biological agents, chemical agents, and ecological manipulation of mosquito breeding habitat.
2. Support actions to establish or find funding for mosquito abatement activities.
3. Remove or disturb water that remains stagnant for more than 3 days at a construction site.
4. Limit construction to cool weather, when mosquito production is lowest.
5. Limit construction to periods of low precipitation to avoid pools of standing water.

Impact 2. Increased risk of groundwater and surface water contamination from naturally occurring or spilled hazardous materials and from improper handling of hazardous materials.

Water use efficiency improvements may result in the long-term operation of pumping equipment for groundwater wells. The risk of long-term groundwater contamination from naturally occurring or spilled hazardous materials, such as the gasoline or propane stored to run the pumps, could increase if groundwater pumps in operation for longer periods were not routinely maintained and inspected. Construction activities associated with Storage and Conveyance elements could expose people to hazardous materials and waste, such as PCBs, petroleum products, pesticides, and metals. Impacts

could be caused by exposure to naturally occurring or spilled hazardous materials, or by subsurface disturbance of contaminated sites. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategy:

1. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
2. Increase monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.

Impact 3. Increased exposure to hazardous materials and waste from construction activities related to storage and conveyance projects and other Program elements.

Some levee reconstruction could create riparian and wetland habitat, resulting in permanent or temporary (during construction) standing water. The presence of standing water could increase the risk of exposure to hazardous materials and waste. In addition, dredging could increase the exposure to hazardous materials from placement of contaminated dredged spoils near population centers and changes in hydrology that could affect the dispersion of hazardous materials. Construction activities associated with Storage and Conveyance elements could expose people to naturally occurring or spilled hazardous materials, or by subsurface disturbance of contaminated sites hazardous materials. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
2. Increase monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.
3. Limit or coordinate construction activities to favorable weather conditions to forestall dispersing hazardous materials.
4. Conduct core sampling and analysis of proposed dredge areas and engineer solutions to avoid or prevent environmental exposure to toxic substances after dredging.
5. Cap exposed toxic sediments with clean clay/silt and protective gravel.

Impact 4. Increases in water quality degradation, resuspension of contaminants, and exposure to hazardous materials from dredging activities.

Dredging may result in temporary water quality degradation, resuspension of contaminants, potential exposure to hazardous materials from placement of contaminated dredged spoils near population centers, and changes in hydrology that could affect the dispersion of hazardous materials. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
2. Limit or coordinate construction activities to favorable weather conditions to forestall dispersing hazardous materials.
3. Conduct core sampling and analysis of proposed dredge areas and engineer solutions to avoid or prevent environmental exposure to toxic substances after dredging.
4. Cap exposed toxic sediments with clean clay/silt and protective gravel.
5. Use cofferdams to construct levees and channel modifications in isolation from existing waterways.
6. Use sediment curtains to contain turbidity plumes during dredging.

Impact 5. Increases in levels of methyl mercury released into the Bay-Delta ecosystem from wetland restoration, levee rehabilitation activities and conveyance actions.

Program actions such as wetlands restoration in areas that contain or trap mercury deposits could promote methylation, the process that causes the conversion of inorganic mercury to methyl mercury, causing an increase in the levels of methyl mercury in the Bay-Delta ecosystem. In addition, channel widening and island flooding could disturb sediments contaminated with mercury, increasing the levels of mercury in the Bay-Delta ecosystem. Delta island flooding could produce similar methylation processes as those described for the Ecosystem Restoration Program. Dredging as a component of the Levee System Integrity Program and conveyance improvements could resuspend sediments contaminated with mercury, increasing the levels of mercury in the Bay-Delta ecosystem. The bioaccumulation of toxic methyl mercury in food webs can impact consumers of aquatic organisms, specifically through the consumption of fish caught in the Bay-Delta. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Follow established and proper procedures and regulations for identifying, removing and disposing of contaminated materials.
2. Modify engineering plans to minimize mercury related problems.
3. Conduct core sampling and analysis of proposed dredge areas and engineer solutions to avoid or prevent environmental exposure to toxic substances after dredging.
4. Cap exposed toxic sediments with clean clay/silt and protective gravel.
5. Locate constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.
6. Fund research to identify where these impacts may occur in the solution area.

**Section 7.13 Findings on Specific Impacts and Mitigation Measures:
Potentially Significant Adverse Impacts on Visual Resources
Associated with the Preferred Program Alternative**

Impact 1. Long-term visual impacts of new facilities or modified existing facilities.

New levees and embankments could visually dominate the surrounding flat, open landscape and could permanently change the visual quality and character of the project area.

Water storage facilities could include the presence of constructed linear and obtrusive features (such as dams and spillways); view obstructions; and fluctuating water levels, creating a bathtub ring effect. Water diversion and conveyance facilities could include the presence of constructed linear and obtrusive features (such as inlet structures, fish screens, pipelines, and siphons) and could obstruct views. Flow control barriers in the south Delta could impede boater access to scenic areas. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Time changes in flow regimes to minimize “bathtub ring” effects during times of peak recreation use.
2. Locate and direct exterior lighting for construction activities so that it is concealed to the extent practicable when viewed from local roads, nearby communities, and any recreation areas.
3. Site proposed reservoir(s), if possible, to minimize required cut and fill and locate the reservoir on the flattest topographic section of the site to minimize its visibility.
4. Construct facilities with earth-tone building materials or other visually aesthetic design materials.
5. Locate visually obtrusive features, such as burrow pits and dredged material disposal sites, outside visually sensitive areas and observation sites.
6. Select vegetation type, placement, and density to be compatible with patterns of existing vegetation where revegetation occurs in natural areas. Vegetation such as emergent marsh grasses that can tolerate periodic flooding and drying may be useful.
7. Install landscape screening, such as grouped plantings of trees and tall shrubs, to screen proposed facilities from nearby sensitive viewers.
8. Use native trees, bushes, shrubs, and ground-cover for landscaping, when appropriate, at facilities such as dams and pumping-generating plants, and along new and expanded canals and conveyance channels, in a manner that does not compromise facility safety and access.
9. Create view opportunities of outstanding features through selective vegetation reduction or constructing roadside viewing areas.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less

than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

Impact 2. Impacts in visually sensitive areas from restoration actions.

Some ERP actions could result in adverse impacts, such as fencing creeks to protect riparian vegetation, creating borrow pits for gravel replacement, and installing fish screens. This impact could be significant if it persisted for five years or more and occurred in visually sensitive areas. This impact is considered significant.

Implementation of the following mitigation strategy will reduce this impact to less than significant.

Mitigation Strategies:

1. Construct facilities with earth-tone building materials or other visually aesthetic design materials.
2. Locate visually obtrusive features, such as borrow pits, dredged material disposal sites and fences, outside visually sensitive areas and observations sites.
3. Recontour and add vegetation to areas rated as “poor” in variety class.

Impact 3. Degraded watershed views from such actions as erosion control and fire management practices.

The Watershed Program will form partnerships with and provide technical training and support to local watershed groups. Watershed group activities may include erosion control measures, revegetation of degraded habitat, and fire and fuel load management. These activities could degrade views. The Watershed Program does not include timber harvest actions and will not affect existing timber harvesting requirements. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Water areas where dust is generated, particularly along unpaved haul routes and during earth-moving activities, to reduce visual impacts caused by dust.
2. Avoid unnecessary ground disturbance outside the necessary construction area.
3. Revegetate disturbed areas as soon as possible after construction.

4. Create view opportunities of outstanding features, selective vegetation reduction, or constructing roadside viewing areas.
5. Recontour and add vegetation to areas rated as “poor” in variety class.

Impact 4. Creation of borrow pits or spoils material disposal sites associated with storage, conveyance, levee projects, and other Program actions.

Creation of borrow pits or spoils material disposal sites associated with storage, conveyance, levee projects, and other Program actions could be significant if the visual impacts persisted for five years or more and occurred in visually sensitive areas. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact to less than significant.

Mitigation Strategies:

1. Revegetate disturbed areas as soon as possible after construction.
2. Locate visually obtrusive features, such as borrow pits and dredged material disposal sites, outside visually sensitive areas and observations sites.
3. Select vegetation type, placement, and density to be compatible with patterns of existing vegetation where revegetation occurs in natural areas.
4. Install landscape screening, such as grouped plantings of trees and tall shrubs, to screen proposed facilities and along new and expanded canals and conveyance channels, in a manner that does not compromise facility safety and access.
5. Use native trees, brushes, shrubs, and groundcover for landscaping at facilities such as dams and pumping-generating plants, and along new canals and conveyance channels.
6. Recontour and add vegetation to areas rated as “poor” in variety class.

Impact 5. Long-term visual impacts from construction activities extending more than 5 years.

Reservoir facility construction could create temporary or long-term adverse visual impacts, particularly from haul routes, night construction lighting, and construction staging areas. Nearby views of project features under construction could impose temporary visual impacts caused by heavy equipment generating dust and disturbing established topography and vegetation. Short-term adverse impacts on visual quality associated with construction of water storage facilities could include construction grading and removing existing vegetation and habitat. Most of the construction areas for any storage facilities eventually would be inundated, but in some cases the visual impacts could last more than 5 years. This impact is considered significant.

Implementation of the following mitigation strategies will reduce this impact.

Mitigation Strategies:

1. Time changes in flow regimes to minimize “bathtub ring” effects during times of peak recreation use.
2. Minimize construction activities during the peak-use recreation season.
3. Water areas where dust is generated, particularly along unpaved haul routes and during earth-moving activities to reduce visual impacts caused by dust.
4. Avoid unnecessary ground disturbance outside the necessary construction area.
5. Locate and direct exterior lighting for construction activities so that it is concealed to the extent practicable when viewed from local roads, nearby communities, and any recreation areas.
6. Revegetate disturbed areas as soon as possible after construction.
7. Locate visually obtrusive features, such as borrow pits and dredged material disposal sites, outside visually sensitive areas and observation sites.
8. Recontour and add vegetation to areas rated as “poor” in variety class.

The Secretary finds that while the mitigation strategies described above will substantially lessen this impact, based on currently available information, it is unclear that this impact can be mitigated to less than significant. Therefore, for purposes of this programmatic document, this impact is considered significant and unavoidable.

VI. FINDINGS ON SPECIFIC IMPACTS AND MITIGATION MEASURES

B. Mitigation Measures Not Adopted/Rejected

The following mitigation measures recommended in comments on the EIS/EIR are either (1) not adopted because they are inappropriate, or (2) rejected as infeasible due to specific economic, technological, or other considerations.

Reasons for not adopting recommended mitigation measures include:

1. The measure is similar to mitigation measure(s) already incorporated;
2. The measure is less effective than mitigation measures already incorporated;
3. The measure is ineffective in mitigating the adverse effect;
4. The measure is too project-specific for a programmatic document;
5. The measure addresses an impact not caused by the CALFED Program; or
6. The measure does not address an impact on the environment.

A mitigation measure may be rejected as infeasible if it is “[in]capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.” Pub. Resources Code Section 21061.1. Legal or other factors, such as providing employment opportunities, may also be considered in making a finding of infeasibility. See Pub. Resources Code Section 21081; see also CEQA Guidelines Section 15091 (a)(3).

Section 5.2, Hydrodynamics and Hydraulics

Measure Similar to Ones Already Incorporated. The following mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted by the Secretary.

- Provide mitigation strategies aimed at reducing significant impacts to Bay-Delta hydrodynamics and riverine hydraulics (e.g., unacceptable velocity increases) in Section 5.2.

Mitigation strategies are not included in Section 5.2 because the section only describes the hydrodynamic and hydraulic modeling used for the environmental analysis. The environmental impacts resulting from hydrodynamic and hydraulic changes are addressed in other sections of the EIS/EIR in the context of each of the resources affected. For example, impacts on water quality, soils, fisheries and aquatic ecosystems, and flood control and appropriate mitigation strategies are addressed in Sections 5.3, 5.5, 6.1, and 7.8, respectively.

Section 5.3, Water Quality

Measures Similar to Ones Already Incorporated. The following mitigation measures were not adopted because they are similar to, and therefore duplicative of, mitigation measures already incorporated and adopted by the Secretary.

- Implement source control and offset increasing loads to treatment plants due to water transfers and water conservation as a measure to reduce total dissolved solids (TDS).
- Include mitigation strategies for the potential increase in organic carbon, bacteria, and pathogens from the Ecosystem Restoration Program.

To the extent Program actions would result in increases of constituents of concern such as TDS, total organic carbon (TOC) and pathogens, mitigation strategies in Section 5.3, including treating wastewater at the source, upgrading water treatment processes, and applying agricultural and urban Best Management Practices, will reduce these impacts to less than significant. The recommended mitigation measures are therefore not adopted.

Measures that Address an Impact Not Caused by the CALFED Program. The following mitigation measures were not adopted because they address an environmental impact not caused by the CALFED Program.

- Mitigate the selenium impacts of refineries and municipalities in the North Bay area by assisting with financing a drainage facility for San Joaquin Valley selenium loads.

Selenium impacts are not caused by the CALFED Program. This comment addresses existing selenium impacts of refineries and municipal treatment facilities, not CALFED actions. However, CALFED includes actions such as agricultural land retirement in the western San Joaquin Valley to reduce the adverse effects of selenium in order to reach its primary objectives for water quality and ecosystem quality. This mitigation strategy is therefore not adopted.

- Include mitigation measures to address bromide reduction to the State Water Project, such as real time operational flexibility of the export pumps as a means for reducing export of bromide and salinity.

Bromide is an existing constituent of concern which enters the Delta through the intrusion of seawater through the Bay. The impacts of bromide on water quality in the State Water Project is not caused by CALFED Program actions. However, CALFED includes actions such as real-time management of the export pumps to meet water quality objectives. This mitigation strategy is therefore not adopted.

Section 5.7, Transportation

Measure Ineffective in Mitigating the Adverse Effect. The following mitigation measure was not adopted because it is ineffective in mitigating adverse environmental effects.

- Require future EIRs and EISs for project-specific actions to include traffic assessments and analysis of traffic associated with increases in recreational opportunities resulting from new reservoirs, and other land conversions to recreational uses.

All CALFED second-tier projects will be required to meet the requirements of CEQA and NEPA. Traffic analyses do not mitigate transportation impacts, but they may be used to identify the need for project-specific mitigation measures. Traffic analyses may be required for certain second-tier projects. However, not every action that increases recreational uses will require traffic analyses, making it inappropriate to adopt this mitigation measure at the programmatic level. This mitigation strategy is therefore not adopted.

Section 5.8, Air Quality

Measure Similar to Ones Already Incorporated. The following mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted by the Secretary.

- Work with local and regional planning jurisdictions to identify areas subject to agricultural land conversion for advance planning for air quality impacts.

Mitigation strategies 4, 11, and 21 on pages 7.1-2, 3 in the EIS/EIR address this suggestion. This mitigation strategy is therefore not adopted.

Section 6.2, Vegetation and Wildlife

Measure Similar to Ones Already Incorporated. The following mitigation measure was not adopted because it is similar to, and therefore duplicative of, mitigation measures already incorporated and adopted by the Secretary.

- The mitigation strategies should discuss need for additional action at the project-specific level if program actions disturb special-status species or protected habitats.

This recommendation is addressed by the adopted Mitigation Monitoring Plan discussed in Chapter 9 of the EIS/EIR and Section V of these CEQA Findings and the Record of Decision. CALFED will monitor all mitigation measures through the Science Program. This mitigation measure is therefore not adopted.

Section 7.1, Agricultural Land and Water Use

Measures Similar to Ones Already Incorporated. The following mitigation measures were not adopted because they are similar to, and therefore duplicative of, mitigation measures already incorporated and adopted by the Secretary.

- Meet Program goals by maintaining land in private ownership, rather than through government purchase.

Mitigation strategies 9, 10, and 14 on pages 7.1-2, 3 in the EIS/EIR address this suggestion.

- Work with local landowners and organizations in planning and developing projects.

Mitigation strategies 4, 11, and 21 on pages 7.1-2, 3 in the EIS/EIR address this suggestion.

- Maintain the productivity and flexibility of agricultural lands to the greatest extent practicable when implementing the entire Program.

This suggestion is too general to be an effective mitigation measure as defined by CEQA. However, several mitigation strategies in Section 7.1.11, such as “Restoring existing degraded habitat as a priority before converting agricultural land,” would assist in serving this purpose.

- Require buffers when developing habitat projects adjacent to agricultural uses.

This recommendation is addressed by mitigation strategy 19 on page 7.1-3 in the EIS/EIR. Specifics on buffer design must be developed at the project-specific level.

- Establish an easement or transfer of development rights program.

The State of California already has developed such a program, the California Farmland Conservancy Program that is administered by the Department of Conservation. This is addressed in mitigation strategy 8 on page 7.1-2 in the EIS/EIR.

- Phase implementation of specific Program components.

This is addressed by mitigation strategy 17 in Section 7.1.11. This strategy would allow implementation to proceed as needed, rather than happening all at once.

- Establish an agricultural mitigation oversight entity to oversee implementation of mitigation by CALFED.

This recommendation is addressed by the adopted Mitigation Monitoring Plan discussed in Chapter 9 of the EIS/EIR and Section V of these CEQA Findings and the Record of Decision. The CALFED Agencies will monitor all mitigation measures through project-specific lead agencies and the Science Program. This mitigation measure is therefore not adopted.

Measures Ineffective in Mitigating the Adverse Effect. The following mitigation measures were not adopted because they are ineffective in mitigating adverse environmental effects.

- Implement a Planned Unit Development approach to habitat development.

Planned Unit Developments are urban planning designations that allow large tracts of housing or commercial development to set their own development standards outside normal zoning ordinances. The comment provides insufficient information to evaluate how Planned Unit Developments could apply as a mitigation strategy.

- Require comprehensive environmental evaluation for projects that will adversely affect agricultural lands, using the NRCS Land Evaluation and Site Assessment (LESA) system.

All CALFED second-tier projects will be required to meet the requirements of CEQA and NEPA. LESA may be used by Federal agencies, as appropriate for the scale of project, and can optionally be used by State agencies. LESA evaluates various aspects of the agricultural site proposed for development, including the quality of soils and size of parcel. However, LESA is designed to gauge the impacts of urban-type development and may be misleading if used to measure the significance of projects such as wildlife habitat creation. For instance, one of the criterion contained in LESA for measuring the effects of a project is the distance from existing urbanization—the further from an urbanized area, the greater the score for agricultural land impacts. While this is an appropriate measure to judge the impacts of urbanization and to evaluate the growth-inducing potential of a project, it is an inappropriate measure to evaluate the significance of habitat conversion projects. Habitat projects usually are not near existing urbanization and do not contribute to growth inducement. Therefore, the full or partial use of LESA may or may not be appropriate at the project-specific level but should not be required.

Measures Too Project Specific for Programmatic Document. The following measures are too project-specific for a programmatic document. In developing project-specific mitigation measures in second-tier environmental documents, CALFED agencies will continue to consider any appropriate measures that help avoid or reduce environmental impacts.

- Provide development agreements to support remaining agricultural lands when a project results in agricultural land conversion.

It is unclear what type of impact this measure would mitigate. It appears to be a separate agreement to carry out mitigation measures at the project-specific level. Project-specific mitigation measures will be included in second-tier environmental documents, as appropriate, with the required measures, such as conditions of approval, to monitor such mitigation. It is unclear what purpose would be served by a second document memorializing these mitigations.

- Develop specific mitigation measures for the Ecosystem Restoration Program.

The Ecosystem Restoration Program Plan includes categories of projects and generalized potential project locations. The plan does not provide project-specific information, such as precise map locations and acreages, that would be required in a project-specific environmental document. Because locations in the Ecosystem Restoration Program Plan (for example, Yolo Bypass) are currently general, project-specific impacts cannot be determined. Likewise, more detailed mitigation measures for those impacts cannot be determined until more detail on the project is available. The EIS/EIR contains a large number of mitigation strategies for agricultural impacts, which must be used by individual project lead agencies in determining mitigation measures for second-tier projects. Section 7.1.11 includes 27 mitigation strategies for impacts due to agricultural land conversion and local planning impacts; Sections 7.2 and 7.3 include an additional 19 mitigation strategies to reduce adverse agricultural economic and social effects.

- Purchase flood easements and repair existing levees rather than developing setback levees.

Decisions on how best to increase flood protection for lands behind specific levees have not yet been made. The Long-Term Levee Protection Plan includes levee strengthening and setback levees as options. The merits and liabilities of setting back levees will be closely scrutinized, and the use of setback levees may not be feasible or desirable in many cases. Landowners and other stakeholders will be consulted during project formulation. At a programmatic level, the option to use setback levees is included in order to allow flexibility to achieve the primary objectives of ecosystem quality and levee system integrity, depending on the characteristics of the various second-tier levee projects.

- Direct habitat development to poorer quality agricultural soils.

Several mitigation strategies in Section 7.1.11, such as “restore existing degraded habitat as a priority before converting agricultural land,” “focus restoration efforts on public lands before converting agricultural land,” “focus restoration efforts on acquiring lands from willing sellers where part of the reason to sell is economic hardship,” and “use farmer-initiated and developed restoration projects,” would assist in serving this purpose. However, since the various habitat types have specific soils requirements, as do agricultural crops, this measure will not be appropriate for every habitat restoration action. While this measure will be considered for second-tier projects, it is not appropriate to adopt this mitigation measure at the programmatic level. This mitigation strategy is therefore not adopted.

Measures that Address an Impact Not Caused by the CALFED Program. The following mitigation measures were not adopted because they address an environmental impact not caused by the CALFED Program.

- Reaffirm the State’s right-to-farm policy.

The right-to-farm statute was designed to prevent impacts on agriculture from encroaching urbanization and generally does not apply to the CALFED Program actions. In addition, reaffirming an existing statute is not a mitigation measure.

Measures that Do Not Address an Impact on the Environment. A number of mitigation measures recommended by commentators deal solely with changes in water use, and social or economic impacts. CEQA requires findings for impacts on changes to the physical environment only; therefore, mitigation measures that do not result in physical changes but affect water use, social and economic impacts are not included, but ways to reduce social and economic impacts are addressed in Sections 7.2 and 7.3. Accordingly, the following mitigation strategies are not adopted.

- Before implementing any action requiring additional water, develop the water source; if water is from former agricultural use, mitigate the significant environmental impact.
- Develop an Agricultural Water Account to mitigate for agricultural water directed to CALFED uses.

CALFED Agencies will, by necessity, need to identify and purchase water for projects before that water is applied. That is not a mitigation measure but a practical reality given California’s water rights laws. The change in the amount of water used for agriculture apart from its effects on land use or other environmental effects, however, in itself is not an environmental impact under CEQA. See CEQA

Guidelines, Appendix G. As used in CEQA, the “existing environment” contains both natural and human-made features. Section 7.1 describes the existing environment as it pertains to agriculture. The term “water use” is vague and can be used in various contexts, some with associated environmental impacts. The environmental impacts resulting from a change in the amount of water use are addressed in other sections of the EIS/EIR in the context of each of the resources affected. For example, where changes in water use lead to loss of agricultural land, impacts to groundwater levels, or to water quality, those impacts are addressed in Sections 7.1, 5.4, and 5.3, respectively. Loss or conversion of agricultural land is considered a significant and unavoidable impact of the Program even though all feasible mitigation measures were adopted to reduce this impact. Economic and social effects of water transfers and other Program actions and ways to reduce these impacts are discussed in Sections 7.2 and 7.3, respectively.

- Pay fair market values.

Payment of fair market values does not address an environmental impact and is incorporated as a standard Program policy to minimize economic effects described on page 7.2-23 in the EIS/EIR.

- Scheduling construction activities to allow harvests.

Scheduling construction activities to allow harvests is incorporated as a standard Program policy to minimize economic effects and is described on page 7.2-23 in the EIS/EIR.

Mitigation Measures Rejected as Infeasible. The following mitigation measures are rejected as infeasible for specific economic, legal, environmental, social, technological, or other considerations.

- Establish Agricultural Exclusive zoning.

Establishing zoning is a local responsibility. CALFED Agencies have no authority to establish local zoning, even in conjunction with the Delta Protection Commission. This mitigation measure is therefore rejected for legal considerations. Moreover, it is unclear how agricultural zoning would mitigate for ecosystem restoration actions which affect agricultural land, as these types of activities would normally be allowed in agriculturally zoned areas.

- Increase subvention funding and property tax sharing and develop legislation for rural development zones.

Increased subvention funding and property tax sharing, and legislation for rural development zones are outside the abilities of the CALFED Agencies to implement at this time. These suggestions are more appropriately directed to the Legislature. This mitigation measure is therefore rejected for legal

considerations.

- When conversion occurs, remove Class I and II soils from the habitat site to other agricultural locations.

This measure could hamper ecosystem restoration progress because habitat types have soil requirements similar to agricultural crops. For instance, valley oak woodlands would not grow on hard, poorly drained soils. The costs of moving vast amounts of soils may not be justified by the gains from the receiving parcels and could limit the ability to restore the land to agricultural purposes in the future. Further, additional regulatory hurdles, such as triggering the Surface Mining and Reclamation Act, could make this mitigation even less economically feasible. This mitigation measure is therefore rejected for economic, legal and technological considerations and because it could cause new adverse environmental impacts.

- Require 1 acre of farmland to be protected for every acre converted.

Protection of off-site lands to mitigate conversions of farmlands is addressed in adopted mitigation strategy 8 of Section 7.1. However, the exact amounts to be protected would depend on the project-specific impacts of conversion, as measured in the second-tier environmental document. The feasibility of this mitigation strategy would also need to be evaluated at the project-specific level, and would depend on the number of voluntary participants in the easement program and the cost of acquiring the easements. At a programmatic level, the feasibility of this measure is too uncertain. This mitigation measure is therefore rejected for technical and economic considerations.

- Adopt a no-net-loss policy for agricultural land.

Because the Program will require agricultural lands in the Delta and elsewhere for Program purposes, a no-net-loss policy as suggested would require at least a 1:1 replacement as mitigation for any agricultural lands converted to Program purposes. This proposed mitigation is infeasible. Very few local governments have adopted payment of an in-lieu fee as a mitigation for protection of an equivalent amount of agricultural land to that which is converted. The cost of purchasing and providing land, irrigation infrastructure, and water as mitigation for agricultural land loss—which direct replacement would require—would make almost any project that is converting agricultural lands infeasible, whether for habitat or urban uses. In addition, irrigation of new lands can cause its own series of environmental impacts. For example, converting dry-farmed or grazed lands to monocultures such as vineyards can cause reduction in habitat for raptors and many other species. The Department of Conservation's Farmland Conversion Report - 1994 to 1996 states that most land converted from the Farmland of Local Importance category to the Unique Farmlands category in San Joaquin County were pasturelands planted to vineyards (2,179 acres). Most lands that are best for irrigated crops have already been irrigated. Currently unirrigated lands may have drainage problems or soil problems that

could cause even more impacts, such as the need for drains or a limited life due to leaching. Providing additional water can also increase demands on existing, overdrafted groundwater basins. (DWR Bulletin 160-98.) Providing infrastructure for irrigation and access would be costly and would also cause additional environmental impacts. This is especially costly where small isolated tracts of land are proposed for irrigation, and the infrastructure costs are not spread across a large number of beneficiaries. Section 7.1.12 describes farmland conversions caused by the Program as a potentially significant environmental impact at the programmatic level. The Program objectives to improve and increase terrestrial habitats in order to support sustainable populations of diverse and valuable plant and animal species in the Bay-Delta cannot be achieved without some creation of habitat on land currently used for agriculture. This mitigation strategy is therefore rejected as infeasible due to technical, economic, and legal considerations.

Section 7.12, Public Health

Measure that Addresses an Impact Not Caused by the CALFED Program. The following mitigation measure was not adopted because it addresses an environmental impact not caused by the CALFED Program.

- CALFED must include mitigation to assure that urban water agencies can cost-effectively treat water from the Delta for public health protection since there are no definite plans to construct an isolated facility.

CALFED actions will not reduce the quality of drinking water nor increase the cost of drinking water treatment. However, CALFED includes source control, water treatment facility improvements and other actions to protect public health. This mitigation strategy is therefore not adopted.

VII. CUMULATIVE IMPACTS

As used in CEQA, cumulative impacts “refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” A cumulative impacts analysis can identify impacts that “result from individually minor but collectively significant projects taking place over a period of time.” CEQA Guidelines Section 15355. The analysis in this EIS/EIR considers the cumulative impacts of implementing the different actions included within the long-term Program, as well as the collective impacts of the Program actions considered in connection with impacts of other projects with similar impacts on related environmental resource areas.

The CALFED Program involves the approval at a broad planning level of a long-term program to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The Program is a general description of potential actions that will be further refined, considered, and analyzed for project-specific environmental impacts as part of second-tier environmental documents prior to making a decision to carry out these later actions. The EIS/EIR focuses on a general overview of impacts of all of the associated actions and mitigation measures to avoid or reduce these impacts.

At the general programmatic planning level of analysis of this EIS/EIR, the incremental contribution of each of the many possible actions within the scope of the Program to cumulative impacts is difficult to separately analyze. Thus, the overall, long-term impacts of the Program as a whole are described in broad categories of impacts to which the various actions within the Program may contribute over the 30-year planning time frame. This analysis is designed to identify impacts to which various actions within the Program may contribute, and which might not be considered significant if individual project components were analyzed in isolation from each other, or in isolation from other past, present and probable future projects.

In general, the analysis of cumulative impacts is qualitative. Impacts were identified based on: (1) information extracted from existing environmental documents or studies for the resource categories potentially affected by each project, and (2) knowledge of expected effects of similar projects in the study area.

Cumulative Impact Analysis Screening Criteria. The CALFED Bay-Delta Program used the following criteria to identify reasonably foreseeable actions to be included in the cumulative impact analysis. The impacts of the related past and present actions are reflected in the description of existing conditions in the EIS/EIR. All of the criteria had to be met for an action to be included in the cumulative impact analysis.

Is the action under active consideration?

Does the action have recently completed environmental documentation or are environmental documents in some stage of completion?

Would the action be completed and operational within the time frame being considered for the CALFED Bay-Delta Program?

Does the action, in combination with the CALFED Bay-Delta Program action alternatives, have the potential to affect the same resources?

The reasonably foreseeable projects and programs considered in concert with the Preferred Program Alternative in this cumulative analysis include the following:

- American River Water Resource Investigation
- American River Watershed Project
- CVPIA (Ecosystem Restoration, Water Transfer, Water Use Efficiency, and Water Quality Programs)
- CCWD Multi-Purpose Pipeline Project
- Delta Wetlands Project (Ecosystem Restoration Program)
- Hamilton City Pumping Plant Fish Screen Improvement Project (Ecosystem Restoration Program)
- Interim South Delta Plan (ISDP) (Conveyance Element)
- Montezuma Wetlands Project (Ecosystem Restoration Program)
- Pardee Reservoir Enlargement Project
- Red Bluff Diversion Dam Fish Passage Program (Ecosystem Restoration Program)
- Sacramento River Flood Control System Evaluation (partial)
- Sacramento Water Forum Process (Ecosystem Restoration Program)
- Trinity River Restoration Program (proposed flows are included in modeling assumptions for the Preferred Program Alternative)

- EBMUD Supplemental Water Supply Project
- Sacramento County M&I Water Supply Contracts
- Urbanization (future population growth is included in modeling assumptions for the Preferred Program Alternative)
- West Delta Water Management Program (Ecosystem Restoration Program)
- Sacramento River Conservation Area Program (Ecosystem Restoration Program)

A more detailed description of these projects and programs is included in Attachment A to the EIS/EIR.

In general, the conclusions regarding the significance of the Preferred Program Alternative's contribution to cumulative impacts are the same as the conclusions regarding the Preferred Program Alternative's long-term impacts. This is due to the long-term nature of the Program, the size of the Program, and the wide range of related potential actions that fall within the scope of the Program. Many impacts of the Program that might not be significant if considered in a separate project-specific analysis of the individual actions that are part of the Program, are treated as significant at this programmatic level of review. In considering impacts from the Program together with impacts of other past, present and probable future projects, the cumulative impacts analysis did not identify any impacts which might cause an individually limited impact that by itself was not significant, but when considered together with other past, present, and probable future projects would be significant.

Although other related water projects considered in the cumulative impacts analysis may have the effect of reducing the availability of water supplies or water management options, the Preferred Program Alternative will not contribute to this impact. Based on the use of alternative water management tools, including water use efficiency measures, water recycling, and water transfers, as well as conveyance improvements, the Environmental Water Account, and new storage, the Preferred Program Alternative will improve water supply reliability and water management flexibility.

The Preferred Program Alternative is expected to contribute to cumulative impacts in the following resource areas which would be significant without mitigation: Water Supply and Water Management, Water Quality, Groundwater Resources, Geology and Soils, Noise, Air Quality, Urban Land Use, Utilities and Public Services, Flood Control, Cultural Resources, and Public Health and Environmental Hazards.

At the programmatic level of analysis, the CALFED Program's contribution to cumulative impacts resulting from environmental consequences in these resource areas are expected to be avoided, reduced, or mitigated to a less than cumulatively considerable level by the mitigation measures adopted. The description of the environmental consequences and the mitigation measures adopted in Section VI, Sections 5.1, 5.3, 5.4, 5.5, 5.6, 5.8, 7.4, 7.6, 7.8, 7.11, 7.12 of these findings are hereby incorporated by reference as descriptive of the Program's contribution to cumulative impacts and adopted as mitigation measures for the Program's contributions to cumulative impacts.

The Preferred Program Alternative would contribute to cumulative impacts in the following resource areas which would remain significant even with the mitigation measures adopted: Transportation, Fisheries and Aquatic Ecosystems, Vegetation and Wildlife, Agricultural Land and Water Use, Recreation Resources, and Visual Resources. The description of the environmental consequences and mitigation measures in Section VI, Sections 5.7, 6.1, 6.2, 7.1, 7.7, and 7.13 of these findings are hereby incorporated by reference as descriptive of the Program's contribution to cumulative impacts and adopted as mitigation measures for the Program's contributions to cumulative impacts. Although these mitigation measures will substantially reduce the environmental impacts in these resource areas, at this programmatic level of analysis, one or more impact in these resource areas remain significant even after adoption of all feasible mitigation measures. These are:

Section 5.7, Transportation

- Impact 3: Relocating or permanently closing roads.

Section 6.1, Fisheries and Aquatic Ecosystems

- Impact 1: Increased non-native species abundance and distribution to levels detrimental to native species from reestablishment of aquatic areas.

Section 6.2, Vegetation and Wildlife

- Impact 4: Temporary and permanent fragmentation of riparian habitats and/or wildlife movement corridors.
- Impact 6: Loss of portions of rare natural communities and significant natural areas.

Section 7.1, Agricultural Land and Water Use

- Impact 1: Conversion of prime, state-wide important, and unique farmlands to project uses.
- Impact 2: Conflicts with local government plans and policies.
- Impact 3: Conflicts with adjacent land uses.

Section 7.7, Recreation

- Impact 4: Temporary or permanent changes in boating access and navigation.

- Impact 8: Displacement of fish and wildlife and loss of terrestrial and loss of on-stream recreation from new off-stream or expanded on-stream reservoirs.

Section 7.13, Visual Resources

- Impact 1: Long-term visual impacts of new facilities or modified existing facilities.
- Impact 5: Long-term visual impacts from construction activities extending more than 5 years.

The Secretary finds that the specific economic, technological, environmental, social, and other considerations in support of the Program outweigh these significant adverse impacts for the reasons set forth in the Statement of Overriding Considerations.

VIII. GROWTH-INDUCING IMPACTS

The Preferred Program Alternative is expected to result in an improvement in water supply reliability for beneficial use in the Bay Region, Sacramento River Region, and San Joaquin River Region, and South-of-Delta SWP and CVP Service Areas. The Levee System Integrity Program actions will protect water supply reliability by maintaining levee and channel integrity, and levee actions will indirectly improve water supply reliability by designing actions to provide simultaneous improvement in habitat quality. Improvements in water quality will increase the utility of water, making it suitable for more uses and reuses. Improvements in water quality will also result in improved ecosystem health, with indirect improvements in water supply reliability. Any increase in water quality impacts, such as non-point source pollution associated with new growth, is anticipated to be offset by the substantial water quality improvements from the water quality and watershed management elements of the Program. Improvements in ecosystem health through the Ecosystem Restoration Program will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions. The Water Use Efficiency and Water Transfer Programs will increase water supply reliability by more efficient use and reuse of existing water supplies. Modifications in Delta conveyance will result in improved water supply reliability, protection and improvement of Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees. Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

Consistent with the stated purposes of the CALFED Program since its outset in 1995, it is not the intent of this Program to address or solve all of the water supply problems in California. The CALFED Program is directly or indirectly tied to a number of specific project proposals that would help toward meeting California's water needs for a wide variety of beneficial uses. CALFED is an important piece of a much larger picture that is the continuing responsibility of local, regional, State and Federal jurisdictions.

There are differences of opinion as to whether improvements in water supply reliability would stimulate growth. The causal link between the CALFED Program and any increase in population or economic growth, or the construction of additional housing is speculative at this time. However, because this issue cannot be determined with certainty at this programmatic level of analysis, the assumption was made for this document that the improvement in water supply reliability that is associated with the Program could stimulate growth. This assumption assures that the EIS/EIR discloses the environmental consequences, at a programmatic level, associated with growth in the event that Program actions ultimately lead to this type of change.

At this programmatic level, it is unknown what level of growth or the likely location of any increases in population or construction of additional housing would take place. Increases in the population in the solution area are projected over the next 30 years, regardless of CALFED actions. When population growth occurs, it could lead to additional adverse impacts in certain locations, which local, regional, State, and Federal agencies will need to address when more information on those impacts and how to mitigate them is known. These impacts could include impacts on water quality and air quality, transportation, loss of open space, and other resource areas addressed in the EIS/EIR.

When additional growth occurs, these changes will be subject to local land use and regulatory decisions by individual cities and counties in the areas where they occur. Future development at the local level is guided by many considerations, only one of which is the reliability of water supply. These other factors include the policies in local general plans and zoning ordinance restrictions; the availability of a wide range of community services and infrastructure, such as sewage treatment facilities and transportation infrastructure; the availability of developable land; the types and availability of employment opportunities; and the analysis and conclusions based on an environmental review of proposed projects pursuant to CEQA. When additional population growth or new development occurs, and additional information is available, local, regional, State, and Federal governments will need to consider and address these potential adverse environmental impacts and methods to avoid or mitigate them.

IX. FEASIBILITY OF POTENTIAL PROJECT ALTERNATIVES

CEQA requires the lead agency, the Resources Agency, to consider a range of potentially feasible alternatives to the proposed Program. See Public Resources Code Sections 21002 and 21081; see also CEQA Guidelines Section 15126.6(f). “Feasible” means capable of being accomplished in a successful manner within a reasonable time, taking economic, environmental, legal, social and technological factors into account. CEQA Guidelines Section 15364. The range of alternatives to be considered is governed by a “‘rule of reason’ that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project.” CEQA Guidelines Section 15126.6(f). Additionally, CEQA does not require the consideration of alternatives that are incompatible with the fundamental objectives of the Program or alternatives that would change the basic nature of the Program See *Save San Francisco Bay Ass’n v. San Francisco Bay Conserv. & Dev. Comm’n* (1992) 10 Cal.App. 4th 908, 919; *Marin Mun. Water Dist. v. KG Land Cal. Corp.* (1991) 235 Cal. App. 3d 1652.

A. Alternatives Considered and Not Taken Forward

1. Evaluation of Alternatives Against the Program Mission, Objectives and Solution Principles.

Purpose of the CALFED Program. In the past two decades, disagreements regarding the use and management of the Bay-Delta have increasingly taken the form of protracted litigation and legislative battles. These disagreements have not yielded solutions to the water-related conflicts centering in the Delta. The CALFED Program was established to reduce these conflicts and provide a solution that competing interests could support. Specifically, the mission of the CALFED Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program evaluated a wide range of alternatives to determine the best way to fulfill this mission. Because both of the purposes composing the CALFED mission are essential to the success of the CALFED Program, only alternatives that would both restore ecological health and improve water management for beneficial uses of the Bay-Delta system were carried forward for detailed consideration.

2. Elimination of Alternative Configurations

Early in the Program, in Phase I, CALFED initiated a lengthy, inclusive public process to develop alternatives in order to accomplish its mission. The Phase I process developed alternatives in

six steps: identify problems, define objectives, identify actions, develop solution strategies, assemble alternatives, and refine alternatives. Early in Phase I, the Program identified 50 categories of actions to resolve Bay-Delta problems and achieve Program objectives. These action categories were drawn from existing literature and participation from CALFED agencies, the Bay Delta Advisory Council, and numerous workshops with stakeholders and the general public. Within these categories, hundreds of individual actions were defined. The action categories represent the building blocks of the alternatives. In other words, each alternative is a combination of action categories reflecting differing approaches to achieving Program objectives and addressing solution principles.

As a way to manage the number of alternatives while still representing the full range of approaches to resolving problems, CALFED focused on the critical conflicts in the Bay-Delta system to help define an initial set of alternatives. These conflicts included the relationships between:

- C Fisheries and diversions
- C Habitat and land use and flood protection
- C Water supply availability and beneficial uses
- C Water quality and land use

Approximately 100 initial alternatives resulted from this focus. The initial alternatives varied in the level of effort applied to actions related to water use efficiency, water quality, ecosystem quality, and levee system integrity components.

Following evaluations and comments received at public meetings, workshops, and in writing, CALFED reached a number of conclusions regarding the makeup of each alternative:

The best possible source water quality is of paramount importance to urban water supplies. Agencies that deliver drinking water were very concerned about the cost of meeting future drinking water quality standards, as well as the technical challenges associated with treating source water of degraded quality. This suggests strong pollutant source control measures in every alternative.

Delta levees will be needed to protect agriculture, infrastructure, and habitat no matter how water is conveyed in the Delta. Delta levees protect many things of values, including farms, habitat, infrastructure, and Delta water quality. Even if a new conveyance facility is built that protects water quality for some export users, adequate levee integrity will still be required to protect water quality, facilities and property in the Delta. This argues for a similar level of Delta levee protection in each alternative.

Ecosystem actions in the Program needs a single coherent vision of ecosystem restoration. The restoration of ecosystem functions and the recovery of Bay-Delta

species likely will require diverse actions that will be extensive in scope. There is really no alternative to a single comprehensive plan for restoring ecosystem health. Adaptive management will be vital in guiding efforts to improve ecosystem quality. It is this adaptive management that will provide the needed flexibility in the Ecosystem Restoration Program.

Water use efficiency must be strongly pursued in all the alternatives. This suggests that water use efficiency measures should be implemented at a substantially increased level among all the alternatives. Water use efficiency will maximize use of existing supply to meet all needs and reduce the need for new storage.

The Program then refined the alternatives, which led to selection of a set of Phase II alternatives that was large enough to offer a reasonable range of solutions while small enough to allow for detailed analysis. Three basic alternative approaches developed in Phase I of the Program were carried into Phase II. Seventeen alternative configurations of the three basic alternative approaches were developed to further explore potential refinements for storage and conveyance in Phase II. Of the seventeen configurations, five were eliminated from further evaluation, and the environmental consequences of twelve of these were evaluated in the March 1998 Draft Programmatic EIS/EIR.

Based on public and agency comments on the March 1998 Draft Programmatic EIS/EIR and additional technical analysis, the Program was able to further refine and narrow the number of alternative solutions to the four evaluated in the July 2000 Final Programmatic EIS/EIR. Reasons for the elimination or consolidation of alternatives included technical deficiencies, creation of conditions damaging to the aquatic environment, higher costs relative to similarly performing alternatives, and the lack of a south Delta conveyance improvement element. The Program has determined that the Program objectives cannot be met without some south Delta conveyance improvements.

The four alternatives evaluated in the Final PEIS/EIR, Alternatives 1, 2 and 3 and the Preferred Program Alternative, vary primarily in their approach to water conveyance. Three basic alternative approaches were formed around different configurations of Delta conveyance: existing system conveyance, modified through-Delta conveyance, and dual-Delta conveyance. Each approach includes the same set of actions for water use efficiency, water quality, levee system integrity, ecosystem quality, water transfers, and watersheds. A range of storage options was evaluated for each alternative to support these programs and the Delta conveyance, and to seek a balance between attainment of Program objectives and cost effectiveness. For further discussion of these alternatives and the No Action Alternative and a comparison of each of the alternatives to the Preferred Program Alternative see section 2.1.4 below.

A detailed description of the program alternative selection process can be found in Section 1.4 and Response to Comment document of the EIS/EIR.

3. Elimination of Alternatives Recommended in Comments that Focus on One Primary Objective or Would Disregard or De-emphasize One or More Primary Objectives

A number of alternatives recommended in comment letters focus on one primary objective or would disregard or de-emphasize one or more primary objectives of the CALFED Program. Alternatives that would not achieve the primary interrelated objectives of the CALFED Program were not evaluated in detail, as they would not carry out the basic purpose of the Program.

Comment letter number 1199 raised an alternative that calls for substantially more ecosystem restoration and extensive land use changes than those in the CALFED Preferred Program Alternative. Other comments raised similar alternative scenarios. Each of these alternatives could result in significant redirected impacts to Delta agriculture and land use, would be substantially more expensive, and would suffer from lack of stakeholder support. Therefore, the Secretary finds that these alternatives are rejected as infeasible due to economic and social considerations and because they would not be consistent with the solution principles.

Comment letter numbers 1222, 1349, and others raised an alternative that de-emphasizes ecosystem restoration to avoid conversion of agriculture to natural habitats. Other comments raised similar alternative scenarios. In developing the ecosystem quality objective during the Phase I scoping process, following public comment, the CALFED Agencies determined that restoring ecological health to the Bay-Delta system cannot be accomplished without conversion of some agricultural land within the Bay-Delta to natural habitats. While the Program will focus on restoring habitat on public lands first and has committed to mitigation measures to avoid and minimize impacts of conversion, some conversion of agricultural land cannot be avoided. Therefore, the Secretary finds that these alternatives were not considered because they would not meet the ecosystem quality objective of the Program, one of the four primary objectives.

Comment letter numbers 1184, 1198, 1199, 1210, 1341, 1383, and others raised an alternative that relies solely on water use efficiency and conservation measures to avoid the construction of storage and conveyance facilities. Other comments raised similar alternative scenarios. Substantial and ambitious water use efficiency goals are incorporated in the CALFED Program. However, reliance solely on water use efficiency measures does not allow the flexibility of water management tools necessary to achieve the water supply, water quality, and ecosystem quality objectives of the Program. These alternatives, by themselves, could not sufficiently improve water management flexibility and therefore would fail to meet CALFED objectives for reducing conflicts in the Delta. Therefore, the

Secretary finds that these alternatives were not considered because they would not meet the Program primary objectives or achieve the goal of the Program.

B. Comparison of Alternatives

These findings compare all alternatives where appropriate in order to provide a basis for selection of the finally approved Preferred Program Alternative. In rejecting certain alternatives, the Secretary has examined the Program objectives and weighed the ability of the various alternatives to meet the objectives. Since all four alternatives carried forward for evaluation vary primarily in the method of conveyance, only the significant impacts associated with conveyance are compared in this finding.

While Alternatives 1, 2 and 3 evaluated in the June 1999 Draft Programmatic EIS/EIR would meet the Program's primary objectives to some extent, each alternative presents tradeoffs. The Preferred Program Alternative was crafted to strike a careful balance of benefits against the environmental impacts, uncertainty and other considerations of the three conveyance approaches. The Preferred Program Alternative accordingly includes elements from each of the three alternatives.

The discussion that follows compares the relative ability to reach Program objectives, environmental impacts, and feasibility of Alternatives 1, 2 and 3 and the No Action Alternative to the Preferred Program Alternative. The Preferred Program Alternative is described more fully in Chapter 2 of the EIS/EIR, Section II of these CEQA Findings of Fact, and in Subsection C. below.

1. Comparison to No Action Alternative

The No Action Alternative is a description of the anticipated physical, project operation, and regulatory environment that would be in place in 2020 if the Program is not approved and implemented. The purpose of this comparison is to highlight the changes to the environment that would take place as a result of implementing various alternatives.

Compared to the No Action Alternative and existing conditions, the Preferred Program Alternative provides significant improvements in terms of its ecosystem quality, water quality, water supply reliability, and levee system integrity effects. Under the No Action Alternative, each of these four areas of critical concern would continue to deteriorate. In addition, the quality of both in-Delta and export water likely would decline under the No Action Alternative. This decline in water quality would adversely affect irrigated agriculture, ecosystem health, fisheries, and drinking water quality. With the continued decline of the ecosystem, interruptions of water deliveries also likely would occur because of constraints on export pumping to protect threatened and endangered species. Finally, under the No

Action Alternative, the Delta levees would continue to be vulnerable to failure because of limited maintenance in some locations and the lack of a comprehensive plan for effective emergency response. The No Action Alternative fails to meet the Program objectives and would result in significant adverse impacts on the health of fisheries, endangered species, species of special concern and their habitat, water quality, and other Bay-Delta resources .

The Secretary has fully considered the No Action Alternative discussed in the EIS/EIR. The Secretary finds that the No Action Alternative fails to meet the Program objectives and would result in adverse consequences for water supply reliability, the health of fisheries, endangered species, species of special concern and their habitat, water quality, and other Bay-Delta resources.

For these reasons, the Secretary rejects the No Action Alternative.

2. Comparison to Alternative 1

Under Alternative 1, Delta channels would be maintained essentially in their existing configuration. Several improvements would be made in the south Delta similar to those in the Preferred Program Alternative. The Preferred Program Alternative includes these actions but also includes north Delta channel modifications for improved water conveyance and flood control and a contingent action, the diversion facility on the Sacramento River. However, if the diversion facility is not constructed, the Preferred Program Alternative would perform most similarly to Alternative 1.

Alternative 1, lacking north Delta channel improvements, would not provide as much flood control and water conveyance benefit in the Delta. Alternative 1 also does not have the potential for water quality improvement provided by the Preferred Program Alternative. The water quality improvement strategy for the Preferred Program Alternative is to aggressively implement the common programs and south Delta improvements in the first stage of implementation, as proposed for Alternative 1. Under the Preferred Program Alternative, however, if these actions do not achieve the water quality objectives, the diversion facility on the Sacramento River could be implemented, pending resolution of fisheries concerns and demonstrated benefits for water quality. This contingent action would improve Delta outflow under the Preferred Program Alternative, and decrease salinity and bromide for in-Delta and export water quality over Alternative 1.

Alternative 1 would create slightly fewer construction- and facility-related impacts on visual resources, cultural resources, geology and soils, transportation, and air quality compared to the Preferred Program Alternative. Since Alternative 1 does not include the option for diversion facility on the Sacramento River, Alternative 1 would avoid the potential for associated impacts on fish populations. However, the diversion facility would only be constructed and operated if adverse

impacts on fish populations could be avoided. Consequently, the Preferred Program Alternative will not have greater adverse impacts on fish populations than Alternative 1.

Alternative 1 provides less operational flexibility than the Preferred Program Alternative and accordingly could create fewer benefits to water supply reliability and water quality. Alternative 1 is therefore less effective in meeting CALFED's primary objectives.

The Secretary has fully considered Alternative 1 discussed in the EIS/EIR. The Secretary finds that while Alternative 1 would meet the Program's goals and primary objectives to some extent, the water quality objective may not be achievable through Alternative 1. Alternative 1 provides less operational flexibility and is less effective in meeting the Program objectives for water quality and water supply reliability and in providing flood control as compared to the Preferred Program Alternative.

3. Comparison to Alternative 2

Alternative 2 would employ a modified through-Delta conveyance approach. Significant improvements to north Delta channels, including construction of setback levees and channel dredging, and construction of a 10,000 cfs diversion from the Sacramento River to the Mokelumne River and associated fish protection facilities, would accompany the south Delta improvements contemplated under Alternative 1 and the Preferred Program Alternative.

The diversion would send greater volume and better quality water from the Sacramento River into the north Delta and east Delta. The diverted water would improve net-Delta outflow which helps to isolate the south Delta pumps from salinity intrusion and reduces the entrainment of San Joaquin River fish. The quality of in-Delta and exported water quality and would improve as compared to the Preferred Program Alternative.

However, Alternative 2 could result in significant adverse impacts on fisheries from the 10,000 cfs diversion facility. Fish mortality would increase as a result of reduced flow on the Sacramento River downstream of the diversion and greater proportion of fish entering Georgianna Slough and the Mokelumne River. Fish mortality would also increase from entrainment at the diversion. There is substantial uncertainty whether a facility as large as 10,000 cfs could be operated and screened sufficiently to avoid or minimize significant adverse effects on fish populations.

While the Preferred Program Alternative incorporates many of the benefits of Alternative 2 derived from north Delta channel modifications, there is uncertainty and concern that objectives for export and in-Delta water quality can be achieved with the common program elements and these actions. If water quality objectives not be met, the Preferred Program Alternative includes a diversion facility on the Sacramento River as a contingent measure to improve export water quality. The facility

would have a capacity no greater than 4000 cfs which would substantially reduce impacts on fisheries, and would provide similar, but less pronounced, water quality improvement as Alternative 2. The diversion facility would only be constructed if it is determined that significant adverse impacts on fish populations can be avoided. Alternative 2 does not include this option. While Alternative 2 could meet the Program's goals and primary objectives to some extent, the water quality benefits of Alternative 2 are outweighed by greater technological uncertainty and adverse impacts on fisheries as compared to the Preferred Program Alternative. Accordingly, Alternative 2 is less effective in meeting the Program objectives.

The Secretary has fully considered Alternative 2 discussed in the EIS/EIR. The Secretary for Resources finds that while Alternative 2 would substantially meet the Program's goals and primary objectives, the ecosystem quality objective may not be achievable through Alternative 2. The greater technological uncertainty and adverse impacts on fisheries outweigh the water quality benefits of Alternative 2 as compared to the Preferred Program Alternative. Accordingly, Alternative 2 is less effective in meeting the Program objectives.

4. Comparison to Alternative 3

Alternative 3 would employ a dual-conveyance approach employing a combination of through-Delta improvements similar to the Preferred Program Alternative and an isolated diversion facility on the Sacramento River to take water by canal to the export facilities in the south Delta.

Initially, the dual-Delta conveyance approach with an isolated facility appeared to provide greater technical performance than the other alternatives. Some of the preliminary scientific and engineering evidence suggests that a dual-Delta conveyance configuration may improve export water quality and achieve fish recovery most effectively. Relative to the Preferred Program Alternative, Alternative 3 would improve export water quality and improve Delta flow patterns for fish migration, including reduced incidence of reverse flow and entrainment in the south Delta pumps.

However, other evidence indicates that such a conveyance configuration can cause significant in-Delta water quality problems. The diversion would substantially reduce the flow of the Sacramento River below the diversion and could adversely affect fish migration and survival. The isolated facility would have a capacity between 5,000 cfs and 10,000 cfs. Higher capacity diversion would pose problems similar to Alternative 2. Additionally, construction-related impacts, land conversion and impacts from operation of the isolated facility, such as seepage, would be substantially greater under the Preferred Program Alternative.

In addition, during scoping and public meetings, many stakeholders and agencies voiced numerous concerns, including the difficulty of in ensuring the appropriate operation of such a facility,

fear that an isolated facility will decrease the incentive to manage the Delta as a “common pool” in which export water supply is coupled with the preservation of the Delta, that decreased dependence on a through-Delta approach could undermine the commitment for balanced solutions involving maintaining Delta levees, improving in-Delta quality and pursuing ecosystem restoration.

For these reasons, Alternative 3 presents the most serious challenges in terms of cost, scientific uncertainty, assurances and implementation. While Alternative 3 may technically perform better for certain resource areas than the Preferred Program Alternative, it is not clear that the additional cost and risk associated with the isolated facility would be worth the benefits. Years of scientific evaluation would be necessary to determine whether an isolated facility would be needed to meet water quality, water supply reliability and fisheries objectives. At the earliest, evaluation, design and permitting the facility would take ten years. Lastly, the isolated facility is so contentious that stakeholder support for the Program would be significantly eroded. Such lack of support could threaten the viability of the entire Program.

The Preferred Program Alternative has a high likelihood of success in a shorter time period. The Preferred Program Alternative also has lower risk, is less controversial, and would require less modification of the environment than Alternative 3. Should the Preferred Program Alternative not achieve a primary objective of the Program in the future, the Program includes a process for determining the conditions under which any future additional conveyance facilities or water management actions would be taken.

The Secretary has fully considered Alternative 3 discussed in the EIS/EIR. The Secretary rejects Alternative 3 as infeasible at this time due to social and technical considerations, based in large part due to the contentiousness and length of time associated with an isolated facility and the uncertainty that it will achieve the Program objectives any better than the Preferred Program Alternative.

5. Conclusion

For the foregoing reasons, the Secretary finds that Alternatives 3 is rejected as infeasible at this time. The Secretary finds that the Preferred Program Alternative is more effective in meeting the Program goals and objectives in the time frame needed for a viable solution and would result in fewer adverse impacts than Alternatives 1 and 2 as well as the No Action Alternative.

C. Benefits of the Preferred Program Alternative

The problems and potential solutions facing the Bay-Delta involve a complex set of interrelated biological, chemical, and physical systems. This complexity, coupled with the broad scope and number

of actions needed to implement the Program, the 30-year or more implementation period, the need to test hypotheses, and resource limitations make it necessary to implement the Program in stages. Consequently, the Preferred Program Alternative provides for implementation of the Program in a staged manner and establishes mechanisms to obtain the necessary additional information to guide the next stage of decision making.

The Preferred Program Alternative consists of a through-Delta conveyance approach, coupled with ecosystem restoration, water quality improvements, levee system improvements, increased water use efficiency, improved water transfer opportunities, watershed restoration, and additional surface waters and groundwater storage. The Preferred Program Alternative meets the Program's multiple purposes, reduces adverse environmental effects, and provides a system of research and monitoring to determine whether modifications or additional actions are needed. The Preferred Program Alternative provides multiple benefits, including:

- C Modifying the timing and magnitude of flow to restore ecological processes and to improve conditions for fish, wildlife, and plants in the Bay-Delta system.
- C Improving and increasing aquatic and terrestrial habitats.
- C Modifying and eliminating fish passage barriers.
- C Constructing fish screens that use the best available technology.
- C Reducing the loads and impacts of bromide, total organic carbon, pathogens, nutrients, salinity, and turbidity.
- C Reducing the impacts of pesticides.
- C Reducing the impacts of trace metals, mercury, and selenium.
- C Improving and maintaining the stability of the Delta and Suisun Marsh levee system.
- C Enhancing flood protection for key Delta islands.
- C Expanding and implementing agricultural and urban conservation incentive programs.
- C Implementing better water management for managed wetlands.
- C Facilitating water transfers while protecting from third parties from potentially significant adverse impacts.
- C Supporting local watershed restoration, maintenance, and conservation activities.
- C Developing appropriate groundwater and surface storage in conjunction with specified water conservation, recycling, and water transfer programs to provide water for the environment at times when it is needed most, and to improve water supply reliability.
- C Modifying existing Delta conveyance systems for improved water supply reliability and water quality, improved ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees.

The Preferred Program Alternative is the most flexible and strategic approach to addressing Bay-Delta problems in that it incorporates the most effective and implementable components of Alternatives 1, 2 and 3. Elements that are undesirable for technological, environmental, economic or

social considerations have been excluded. The Program also minimizes irretrievable commitments of resources; certain facilities and operational changes will only be pursued if less expensive and lower conflict approaches fail to achieve the objectives. For instance, if water quality objectives are not met in the first seven years of implementation, the Preferred Program Alternative includes the option to construct a smaller version of the diversion facility on the Sacramento River described in Alternative 2. This facility would improve in-Delta and export water quality and Delta hydrodynamics compared to Alternative 1 and would be similar to the improvements from Alternative 2 while substantially reducing the fisheries impacts of Alternative 2. While Alternative 3 has the potential to perform technically better for water quality and fisheries, implementation of the isolated facility is currently infeasible and will not be carried forward in the Preferred Program Alternative.

If the Program purposes cannot be fully achieved with the actions proposed in the Preferred Program Alternative, additional actions—including an isolated conveyance facility—may need to be added in the future. Until additional information is available to determine whether water quality objectives and fish recovery goals can be met and which, if any, additional actions will be necessary to achieve the Program goals and objectives, the Preferred Program Alternative is the best alternative to achieve overall project purposes and provide significant beneficial improvements over the conditions anticipated under the No Action Alternative, while establishing a process for obtaining this additional information. Moreover, the way the alternatives are structured, going forward with the Preferred Program Alternative does not preclude the Program’s ability to undertake additional conveyance actions, or other methods to achieve the primary objectives, in the future, subject to appropriate environmental review.

As described above, the Preferred Program Alternative adopts a set of programmatic actions designed to achieve the objectives for each of the resource areas while evaluating the effectiveness of those actions, and assessing whether modifications may be needed to meet Program goals and objectives. The Preferred Program Alternative is most effective in meeting Program goals and objectives and managing risk in a manner that has fewer adverse impacts than the other feasible alternatives.

The Secretary has adopted mitigation measures to avoid or minimize adverse environmental impacts described in Section VI of these Findings of Fact with respect to CEQA Guidelines Section 15091. The Secretary finds that all feasible mitigation measures are included in the Preferred Program Alternative and that it best meets the Program’s multi-purpose objectives with the least environmental impact within a reasonable and feasible time frame. However, the Secretary finds that the Preferred Program Alternative could still result in significant and unavoidable impacts and accordingly a Statement of Overriding Considerations has been prepared.

STATEMENT OF OVERRIDING CONSIDERATIONS

A. General Findings

In approving the Preferred Program Alternative analyzed in the Final Programmatic EIS/EIR, the Secretary for Resources has adopted all feasible mitigation measures to avoid or reduce adverse environmental impacts as the Program is implemented. Although the Secretary for Resources believes that all of the unavoidable impacts will be substantially lessened by the mitigation measures incorporated into the Preferred Program Alternative, based on the programmatic level of analysis and existing information, it is not certain that all of these impacts can be avoided or reduced to a less than significant level. Therefore, for purposes of this programmatic document, these impacts are considered unavoidable.

The EIS/EIR and Section VI of the CEQA Findings of Fact identified the following unavoidable impacts:

Section 5.7, Transportation

- Impact 3: Relocating or permanently closing roads.

Section 6.1, Fisheries and Aquatic Ecosystems

- Impact 1: Increased non-native species abundance and distribution to levels detrimental to native species from reestablishment of aquatic areas.

Section 6.2, Vegetation and Wildlife

- Impact 4: Temporary and permanent fragmentation of riparian habitats and/or wildlife movement corridors.
- Impact 6: Loss of portions of rare natural communities and significant natural areas.

Section 7.1, Agricultural Land and Water Use

- Impact 1: Conversion of prime, state-wide important, and unique farmlands to project uses.
- Impact 2: Conflicts with local government plans and policies.
- Impact 3: Conflicts with adjacent land uses.

Section 7.7, Recreation

- Impact 4: Temporary or permanent changes in boating access and navigation.
- Impact 8: Displacement of fish and wildlife and loss of terrestrial and loss of on-stream recreation from new off-stream or expanded on-stream reservoirs.

Section 7.13, Visual Resources

- Impact 1: Long-term visual impacts of new facilities or modified existing facilities.
- Impact 5: Long-term visual impacts from construction activities extending more than 5 years.

The Secretary for Resources has carefully balanced the benefits of the Program. The Secretary for Resources finds that the Program achieves the four key objectives while at the same time balancing competing interests. In addition, the Secretary finds that the environmental, economic, legal, social, public health, planning, technological, and other benefits to be obtained by the Program outweigh the adverse environmental impacts of the Program.

In evaluating the CALFED Bay-Delta Program as a whole, the Secretary for Resources, acting pursuant to CEQA Guidelines Section 15093, finds that the remaining unavoidable and irreversible impacts of the Program are acceptable in light of the environmental, economic, legal, social, public health, planning, technological, and other considerations set forth herein because the benefits of the Program outweigh any significant and unavoidable or irreversible adverse environmental impacts. The Secretary for Resources accordingly makes this Statement of Overriding Considerations in support of these findings on the EIS/EIR. Moreover, the Secretary for Resources finds that where more than one reason exists for any finding, each reason independently supports these findings. The specific considerations which support approval of the Preferred Program Alternative are as follows.

B. Overriding Considerations

1. Need for A Solution for Problems in the Bay-Delta System

Even though environmental, urban, and agricultural interests agree on the importance of the Bay-Delta estuary for both fish and wildlife habitat and as a reliable source of water, few agree on how to manage and protect this valuable resource. In the past two decades, these disagreements have increasingly taken the form of protracted litigation and legislative battles; as a result, progress on virtually all water-related issues has become mired, approaching gridlock. Consequently, these “traditional” efforts to address the Bay-Delta problems have failed to reverse the steady decline of the Delta as fish and wildlife habitat and as a reliable source of water. It is in recognition of these failures that eighteen State and Federal agencies and numerous stakeholders have worked together over the last five years through the CALFED Program to develop a comprehensive plan to reduce these conflicts. Many people believe that CALFED represents the only viable possibility in the foreseeable future to create a lasting and comprehensive solution to Bay-Delta conflicts.

2. Benefits of a Comprehensive and Balanced Approach

CALFED's Preferred Program Alternative provides a unique opportunity to reduce conflicts and reverse the decline of Bay-Delta resources as compared to the No Action Alternative and all alternatives evaluated in the EIS/EIR. Through an investment in the Preferred Program Alternative's comprehensive and strategic efforts, the Program will realize substantial economic benefits, improved water supply reliability, ecological revitalization, improved fisheries populations, substantial water quality benefits, improved public health and safety, protection of property from flooding, achievement toward multiple societal goals, and other benefits.

The Program addresses problems in an integrated fashion. Program elements build upon one another to take advantage of opportunities to leverage funding, multi-benefit actions, and common stakes among different interest groups. Most actions that are taken to meet program objectives, if carefully developed and implemented, will make simultaneous improvements in two, three, or even four problem areas. A comprehensive CALFED solution will also be supported by governance and finance mechanisms that overcome problem-specific or resource-specific limitations of previous, more narrowly focused, approaches.

3. Specific Benefits from the CALFED Program

It is not surprising given the unprecedented geographic and temporal scope of this Program that significant, unavoidable impacts could occur even with the adoption of all feasible mitigation measures. The CALFED solution, described as the largest and most comprehensive program of its type in the world, is an effort of 30 or more years with actions targeting numerous resources across much of the State. Many of the unavoidable adverse environmental impacts of the Program would result from construction and operation of water storage and conveyance facilities. These unavoidable impacts, such as long-term visual impacts, road closure or relocation, and fragmentation of riparian corridors, tend to be localized to the area of the new facilities, and many of the impacts may be successfully avoided or minimized at some, but not all, potential locations. The balancing of the benefits and adverse impacts at any particular site need to be weighed when the project-specific environmental review for that project is considered. Most of the remaining significant unavoidable impacts would result from implementation of the Ecosystem Restoration Program. Although mitigation measures can substantially lessen the Ecosystem Restoration Program impacts on agricultural land, they are an inevitable consequence of achieving one of the essential objectives of the Program; ecosystem restoration in the Delta cannot be achieved without returning some agricultural lands within the Bay-Delta back to their natural state. Additionally, while restoration of habitat may increase the abundance of certain non-native species, information gained from the Program's adaptive management approach and the comprehensive non-native species research and control program will be used to minimize adverse impacts of non-native species.

As compared to the widespread benefits provided by the Program, the majority of these impacts tend to be minimal and localized. The Preferred Program Alternative provides significant improvements in terms of its ecosystem quality, water quality, water supply reliability, and levee system integrity effects compared to the No Action Alternative and existing conditions. Under the No Action Alternative, each of these four areas of critical concern would continue to deteriorate. Due to increasing water demands, there may be increasing pressure to divert more water from the system. At the same time, there will not likely be significant, positive action taken to improve ecosystem quality, with resultant adverse consequences for fisheries, other endangered species and species of concern, and their habitats. In addition, the quality of both in-Delta and export water likely could decline under the No Action Alternative. This decline in water quality would adversely affect irrigated agriculture, ecosystem health, fisheries, and drinking water quality. With the continued decline of the ecosystem, interruptions of water deliveries also likely would occur because of constraints on export pumping to protect threatened and endangered species. Finally, under the No Action Alternative, the Delta levees would continue to be vulnerable to failure because of limited maintenance in some locations and the lack of a comprehensive plan for effective emergency response.

Benefits to the Environment. Substantial environmental benefits would result from implementation of the Preferred Program Alternative. Although some Program elements could result in the loss or degradation of certain natural communities and wildlife habitat, these impacts tend to be minimal and localized relative to the significant, system-wide improvement in ecological health. The Secretary for Resources has balanced these considerations against the unavoidable environmental impacts identified in the EIS/EIR and has concluded that those impacts are outweighed by these environmental, economic, social, and other benefits.

The Ecosystem Restoration Program represents one of the most ambitious and comprehensive restoration projects ever undertaken in the United States. The Program addresses a wide range of aquatic, riparian, and upland habitats throughout the Bay-Delta ecosystem and numerous aquatic and terrestrial species that rely upon the Bay-Delta ecosystem for part or all of their life cycle. The ecosystem restoration element of CALFED is not only unprecedented in its scope but also its ecosystem-based, adaptive management approach described in the Strategic Plan for Ecosystem Restoration. Implementation of the Ecosystem Restoration Program will be guided by adaptive management principles. Under adaptive management, restoration actions are treated as “experiments” designed to test hypotheses about ecosystem function and to permit resource managers to learn from mistakes and adjust future actions accordingly. Additionally, the Program’s strong commitment to scientific research and monitoring will better inform the design and implementation of actions, ensuring that ecosystem restoration addresses the highest priority concerns in the most efficient manner.

The fundamental approach of the Program, ecosystem-based management, is to restore or mimic natural ecological processes, such as improving streamflow variability and magnitude, reactivating sediment transport and channel-forming process, and setting back levees to open a portion of the

ivers' historic floodplains. By restoring ecological processes, the ecosystem will be able to create and maintain aquatic and terrestrial habitats and other, more subtle features of the natural system in order to support stable, self-sustaining populations of diverse and valuable species.

The Ecosystem Restoration Program was designed to achieve multiple goals and objectives. An ultimate goal is to recover the fish species listed under the Endangered Species Act that have forced cutbacks in water exports from the Bay-Delta. However, the Ecosystem Restoration Program goals include restoration of natural ecological processes, enhancing species populations for commercial and recreational harvest, restoration of habitat for public values like scientific research and aesthetics, controlling non-native species, and improving water quality.

As an integrated Program, each of the seven other Program elements contribute significantly to meeting CALFED's mission of restoring ecological health. Water quality improvement actions will address high-priority issues such as high salinity levels, low dissolved oxygen, and acid mine drainage. These measures will improve the suitability of Bay-Delta waters for sustaining aquatic organisms as well as for other beneficial uses of water, such as drinking water and irrigation. The suite of water management tools of the Program will also reduce the strain placed on the Bay-Delta ecosystem by ensuring that water management is done in the least environmentally harmful manner or even contributes to reaching an ecosystem objective, such as timing the releases of water from reservoirs to meet critical species needs. Additionally, new or expanded water storage can capture water during times of abundance and low fisheries impacts. This banked water can later be used during dry periods, either by releasing it to provide downstream water quality and habitat improvement or used in lieu of water pumping, thereby reducing conflicts with fisheries and other aquatic organisms.

Finally, the Environmental Water Account (EWA) is a cooperative management program whose purpose is to provide protection to the fish of the Bay-Delta estuary through environmentally beneficial changes in the Delta operations of the State Water Project and Federal Central Valley Project at no uncompensated water cost to the projects' water users. This approach to fish protection requires the acquisition of alternative sources of project water supply, called "EWA Assets," which will be used to augment stream flows, Delta outflows, to modify exports to provide fishery benefits and to replace the regular project water supply interrupted by the changes to project operations.

Benefits to Agriculture. Substantial water quality, water supply reliability, levee system integrity and other benefits to agriculture would result from implementation of the Preferred Program Alternative. The Secretary for Resources has balanced these considerations against the unavoidable environmental impacts identified in the EIS/EIR and has concluded that those impacts are outweighed by these economic, social, environmental, and other benefits.

The agricultural community and economy has changed significantly in California over the last few decades as a result of encroaching urbanization, protracted drought, listing of endangered species, political shifts, and other issues. Under No Action, urbanization will continue to convert agricultural

land to incompatible, non-agricultural uses. Although the CALFED Program itself would convert some agricultural land to meet the Program objectives, the Program offers many discernable benefits to agriculture through efforts that will improve water quality and increase water supply and reliability for irrigation, facilitate water transfers, protect Delta lands from floods, and strengthen the agricultural economy.

Specifically, ecosystem restoration actions will help to recover currently endangered and threatened species and maintain populations of non-listed species. Recovering listed species will ease current and prevent future regulatory restrictions on water diversions, thereby increasing the quantity and reliability of water available for irrigation. Rehabilitating Delta levees, a task too expensive for many individual farmers, will protect the long-term viability of Delta agriculture. Levee improvements will also reduce the risk of levee failure and corresponding saltwater intrusion. Delta levee rehabilitation, therefore, in conjunction with new or modified water storage and conveyance facilities would improve the quantity and quality of water taken from the Delta. The suite of water management tools will also improve the reliability of water supply, both in terms of its quality and quantity. Reducing uncertainty of water supply and quality will enable farmers and irrigation districts to plan for the future and invest their resources strategically. The EWA will help reduce conflicts between fish and Delta operations, therefore benefitting farmers dependent upon Delta exports.

While conversion of agricultural lands to urbanization due to developmental approvals by cities and counties will continue in the future, farmlands contracted under conservation easements will be productive, permanent components of the agricultural community, protected against development. The Ecosystem Restoration Program will encourage compatible agricultural uses by providing funding for wildlife-friendly agricultural practices on important lands used by wildlife for habitat. Moreover, measures such as buffers between properties and permitting certain agricultural practices on restored floodplains will ensure that ecosystem restoration projects are compatible with adjacent agricultural uses.

Because private lands will be acquired for habitat restoration on a willing seller basis only the agricultural community may benefit from economic efficiencies. Results of early restoration actions under the Category III restoration program show that agricultural lands which are marginal economically, especially flood-prone lands, have been acquired. The capital earned from land sales and reduced costs of managing marginal lands can be reinvested into the local economy through purchase of supplies and equipment including water use efficiency technologies.

Overall, the agricultural economy will be strengthened and more flexible. Water transfers, water use efficiency measures, and improvements in water supply reliability will provide much needed capital and economic efficiency to keep agriculture robust and sound.

Benefits to Urban Water Users. Substantial benefits to urban water users and municipalities would result from implementation of the Preferred Program Alternative. The Secretary for Resources has balanced these considerations against the unavoidable environmental impacts identified in the EIS/EIR and has concluded that those impacts are outweighed by these social, public health, economic, and other benefits.

One of the greatest problems facing urban water users is the unpredictability of the quality and quantity of their drinking water supplies. Annual variations in the availability of high quality water and the need for increasingly expensive treatment processes have made short- and long-term planning difficult. Urban water users and municipalities would benefit substantially from the Program's water quality and water supply reliability actions. The Program's water quality improvement strategy relies primarily on addressing constituents of concern at their source, thereby reducing the costs of treatment for municipalities. Public health will also be improved for the approximately 22 million Californians that use drinking water from the Bay-Delta.

Ecosystem restoration actions will help to recover endangered and threatened species, thereby easing current and preventing future regulatory restrictions on water diversions. The suite of water management tools will also improve the reliability of water supply, both in terms of its quality and quantity. Reducing uncertainty of water supply and quality will enable municipalities to plan for the future and invest their resources strategically. The EWA will help reduce conflicts between fish and Delta operations, therefore benefitting urban water users dependent upon Delta exports.

Economic Benefits. Substantial economic benefits would result from implementation of the Preferred Program Alternative. The Secretary for Resources has balanced these economic considerations against the unavoidable environmental impacts identified in the EIS/EIR and has concluded that those impacts are outweighed by the economic, social and other benefits.

In addition to the economic benefits described above for agriculture and urban water users, there are additional statewide economic benefits. The Program addresses the underlying causes of Bay-Delta problems, rather than the symptoms, in a holistic and multi-faceted approach. Thus, the Program's investment in restoring and managing the Bay-Delta will pay substantial dividends for taxpayers as well as urban and agricultural water users. By rehabilitating Delta levees, property and personal safety will be protected on Delta islands, and the additional costs to taxpayers from catastrophic flood will be reduced. Healthy ecosystem function provides additional benefits such as increased catches for commercial fisheries and economic and legal benefits associated with reduction of regulatory constraints on water diversions.

Social Benefits. Substantial evidence is included in the record of these proceedings demonstrating the social benefits and furtherance of social goals that would result from implementation

of the Preferred Program Alternative. The Secretary for Resources has balanced these social considerations against the unavoidable environmental impacts identified in the EIS/EIR and has concluded that those impacts are outweighed by these social and other benefits.

Compared to the widespread benefits provided by the Program, the adverse impacts from new or expanded reservoirs and conveyance facilities on visual resources, recreation, and transportation tend to be minimal and localized to the area of the new facilities. Although new or expanded surface water reservoirs could impact some existing forms of recreation, the reservoirs themselves and the Program as a whole will result in a substantial enhancement of recreation opportunities, including fishing, hunting, wildlife viewing, boating, and hiking. New facilities would result in permanent visual impacts. These impacts, however, are outweighed by visual improvement provided by habitat restoration.

A restored ecosystem will not only benefit species of concern, but will also help achieve societal goals. Restored habitats will provide for human uses and appreciation, such as enhanced recreation, aesthetics, scientific study, and other non-consumptive uses.

The Program represents a cost-effective and socially-optimal allocation of resources by reducing conflicts over Bay-Delta resources. Society as a whole will benefit from taking positive, affirmative measures to address these conflicts facing the entire State, rather than allowing the parties to return to entrenched litigation or inaction.

C. Conclusion

The Secretary for Resources believes that the important environmental, economic, legal and social benefits described above will be derived from implementation of the Program. These benefits, when weighed against the adverse impacts resulting from taking no action and as compared to the existing environment, override the significant unavoidable adverse impacts of the Program.

The Secretary for Resources has balanced these considerations against the various unavoidable environmental impacts of the Program and concludes that the benefits which will be derived from the implementation of the Program outweigh those impacts.

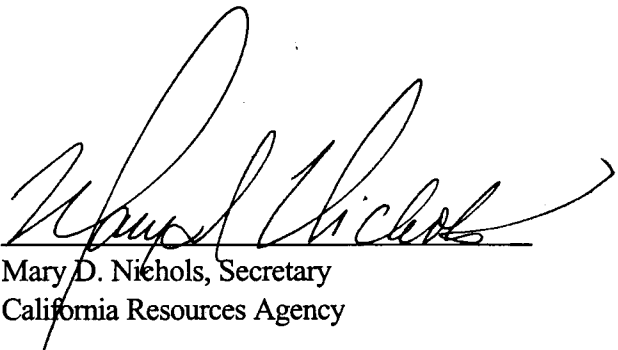
The Secretary for Resources therefore finds that these impacts are acceptable due to the overriding concerns described above and all of the environmental trade-offs involved in this course of action. The Secretary for Resources concludes that the proposed Preferred Program Alternative, with the mitigation measures and strategies adopted in Part VI of these CEQA Findings, should be approved.

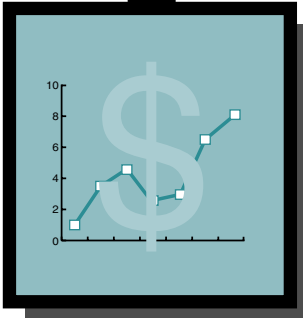
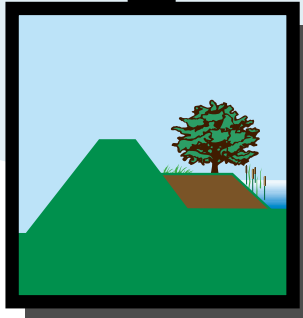
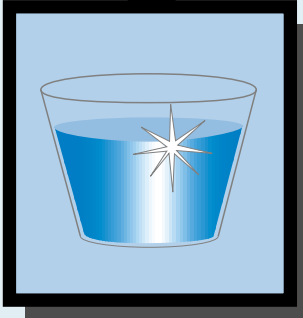
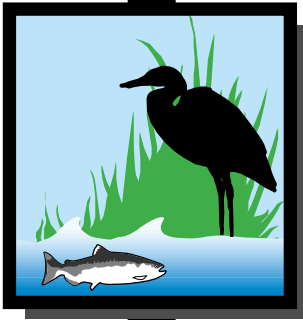
**CERTIFICATION OF THE SECRETARY
CALIFORNIA RESOURCES AGENCY**

I, Mary D. Nichols, Secretary, California Resources Agency, approve the Preferred Program Alternative as described in the Final Programmatic EIS/EIR for the CALFED Bay-Delta Program, dated July 2000, and hereby certify the following:

1. The Final Programmatic EIS/EIR has been completed in compliance with the California Environmental Quality Act.
2. The Final Programmatic EIS/EIR reflects the Resources Agency's independent judgment and analysis.
3. I reviewed and considered the information in the Final Programmatic EIS/EIR before approving the Preferred Program Alternative for the CALFED Bay-Delta Program.

August 28, 2000
Date


Mary D. Nichols, Secretary
California Resources Agency



CALFED
BAY-DELTA
PROGRAM

Attachment 2

Environmental Water Account Operating Principles Agreement

August 28, 2000

ENVIRONMENTAL WATER ACCOUNT

OPERATING PRINCIPLES AGREEMENT

The US Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS) and the California Department of Fish and Game (DFG) (collectively, the Management Agencies), and the US Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) (collectively, the Project Agencies) enter into this Environmental Water Account Operating Principles Agreement on the tools and operations principles for implementing the Environmental Water Account program (EWA) set forth herein and described in the Record of Decision (ROD) for the CALFED Bay-Delta Program to which this Agreement is attached.

Recitals

This Agreement establishes the Environmental Water Account (EWA) program, sets forth the EWA's general operating principles, and describes the tools which are available for use by the EWA. The EWA is a cooperative management program whose purpose is to provide protection to the fish of the Bay-Delta estuary through environmentally beneficial changes in the operations of the State Water Project (SWP) and federal Central Valley Project (CVP), at no uncompensated water cost to the projects' water users. The EWA is intended to provide sufficient water, combined with the Ecosystem Restoration Program and the regulatory baseline, to address CALFED's fishery protection and restoration/recovery needs. This approach to fish protection requires the acquisition of alternative sources of project water supply, called the "EWA assets," which will be used to augment streamflows, Delta outflows, to modify exports to provide fishery benefits and to replace the regular project water supply interrupted by the changes to project operations. The replacement water will compensate for reductions in deliveries relative to existing facilities, project operations and the regulatory baseline as defined in the CALFED Record of Decision that result from EWA actions.

These principles are intended to apply generally, but may not provide the necessary direction in all circumstances. Issues will be resolved as they arise by mutual agreement among all five signatory agencies.

The five state and federal agencies that execute this agreement will have responsibility for implementing the EWA. The Management Agencies will manage the EWA assets and will exercise their biological judgment to determine what SWP/CVP operational changes are beneficial to the Bay-Delta ecosystem and/or the long-term survival of fish species, including those listed under the State and Federal Endangered Species Acts. The Project Agencies will cooperate with the Management Agencies in administering the EWA, including banking, borrowing, and conveyance of EWA assets and making the operational changes proposed by the Management Agencies. The Project Agencies will also be responsible for acquiring EWA assets for the first year.

This Agreement is consistent with the regulatory responsibilities, statutory authorities, including CVP and SWP project purposes, of the five state and federal agencies. After the first year, acquisitions may be made pursuant to a public process that may employ other agencies or third parties to acquire assets.

Article I.
ESTABLISHMENT OF THE
ENVIRONMENTAL WATER ACCOUNT PROGRAM

1. Establishment

The Management Agencies and Project Agencies hereby establish the Environmental Water Account program (EWA) to be implemented in accordance with the Operations Principles and using the Tools set forth hereunder. Each of the Management Agencies and Project Agencies will appoint an EWA coordinator.

2. Initial and Annual Assets

The Management Agencies and Project Agencies will take the following actions to acquire the initial assets for the EWA, and will take all necessary and appropriate steps to acquire them each year thereafter. Assets acquired under sub-articles a-d, below, will vary from year to year depending on hydrological and regulatory conditions, and are therefore not certain. The tools used to acquire the assets are described in Article III of this Agreement. Other tools may be developed as appropriate to acquire functionally equivalent assets

a. SWP Pumping of (b)(2)/ERP Upstream Releases

As provided in Article III.1.b.i, the current modeling indicates that the average annual value of this asset is approximately 40,000 acre-feet.

b. EWA Use of SWP Excess Capacity

As provided in Article III.1.b.ii, the current modeling indicates the average annual value of this asset is approximately 75,000 acre-feet.

c. Export/Inflow Ratio Flexibility

As provided in Article III.1.b.iv(B), the current modeling indicates the average annual value of this asset is approximately 30,000 acre-feet.

d. 500 cfs SWP Pumping Increase

As provided in Article III.1.b.iv(A), the current modeling indicates that the average annual value of this asset is approximately 50,000 acre-feet.

e. Water Purchases

The Project Agencies shall acquire from willing sellers each year 150,000 acre-feet of water from sources south of the Delta and at least 35,000 acre-feet of water from sources upstream of the Delta or their functional equivalents. The upstream-of-Delta purchases may grow in subsequent years. These purchases shall be arranged so that assets may be kept in storage for the entire water year, until such time as the EWA managers release the assets to compensate for an EWA action, or until they are transferred to other EWA storage facilities.

f. One-time Acquisition of Stored Water Equivalent

In order to launch the EWA and to provide sufficient collateral as defined in Article II.2.c.i of this Agreement for the EWA to function as intended, the Project Agencies shall acquire 200,000 acre-feet of stored water or its functional equivalent from south-of-Delta sources. This water is intended to be used as collateral for borrowing, and will be released only when all other assets have been expended. The related storage is intended to function as long-term storage space, including after the water has been released. Provided the asset's function is not impaired, the acquisition of this asset may take any number of forms, including without limitation such transactions as source shifting, or reductions in contractor deliveries.

g. Source Shifting Agreement

The Project Agencies shall arrange with one or more of their contractors to use water totaling at least 100,000 acre-feet from either an alternative source, or at a subsequent time, to allow for storage of the project water in San Luis Reservoir as an EWA asset or to enable an operational curtailment without causing a summer "low-point problem." The EWA will repay this water during the initial 4-year term of the EWA, unless other arrangements are made. Upon repayment, the opportunity to employ the source-shifting tool will become available again.

3. Definition of Operational EWA

As described in Endangered Species Act biological opinions, Conservation Agreement, Record of Decision , the Project contractors will receive certain commitments if, among other things, there is an operational EWA. The EWA shall be considered operational in any one year when the one-time 200,000 acre-feet of stored water equivalent has been acquired and when: 1) the EWA includes deposits of the 185,000 acre-feet of purchased water as described above; 2) a source-shifting agreement of at least 100,000 acre-feet; and 3) the variable tools (items 2a-d above) are all in place. The Management and Project Agencies shall make all attempts to have all items in place by December 31, 2000, so that ESA commitments may be provided to the water users.

4. Science Review Panel

The CALFED Science Program will convene a scientific panel familiar with the EWA and its operations. The Management Agencies and Project Agencies will keep this panel informed on a monthly basis through the CALFED Ops Group reporting process.

The panel will convene on an annual basis to review the EWA operations.

5. Term

The EWA shall expire on September 30, 2004 and any remaining assets shall revert to the Project Agencies, unless the EWA is extended by written agreement among the Management Agencies and Project Agencies and the assets remain in the EWA. The EWA may be terminated at any time if all five signatory agencies execute a written agreement to do so.

6. Continuation of EWA

Before the EWA expires, the Management Agencies and Project Agencies will assess the success of EWA operations and analyze the potential impacts from new facilities and expanded conveyance capacity. The Agencies will then determine the appropriate size and composition of an EWA, as well as the EWA's sharing in the benefits from new facilities, in the fifth and future years.

Article II General Operational Principles

1. The Management Agencies and Project Agencies Shall Cooperate to Implement the EWA

a. Curtailments and Borrowing

The Project Agencies shall make the operational curtailments and agree to the borrowing transactions proposed by the Management Agencies that are consistent with these principles and this Agreement.

b. Acquisitions and Banking

The Project Agencies shall acquire the EWA assets from willing sellers in the first year. The Project Agencies and Management Agencies will establish EWA water banking and accounting mechanisms consistent with the intended EWA fishery benefits and ESA commitments.

i. Manner of Acquiring and Holding EWA Assets

The Project agencies shall, in consultation with the Management Agencies, acquire, hold, and deal with the EWA assets they acquire in a manner that serves the purposes of the EWA program.

ii. Release of Assets

The acquisition and banking arrangements made for EWA assets shall provide for their unconditional release to the Projects or to the Projects' designees upon approval by the Management Agencies.

c. Use of Project Water Rights

The Project Agencies shall use their respective water rights to acquire EWA assets to the greatest extent permitted by State and federal law, including California water rights law, and by the requirements of their respective water supply and other contracts. If changes to these or other water rights are needed to acquire, transfer, or release EWA assets, the Project Agencies shall take timely steps to secure those changes in accordance with State water law. The Project Agencies shall cooperate in all water rights actions and matters to optimize their flexibility in acquiring, conveying, storing and releasing EWA assets.

d. Use of CALFED Ops Group

The Management Agencies and the Project Agencies shall participate in the CALFED Ops Group to report regularly on the EWA's operations, to help resolve issues that may arise, and to communicate with stakeholders. Whenever issues affecting the interests of non-signatory parties arise, such parties shall be afforded the opportunity to fully participate in the resolution of those issues.

e. Exchange of EWA Assets

If the Management Agencies decide to do so, the Project Agencies may exchange EWA assets for assets of a character, such as location, seasonality or year-type, more suitable to EWA purposes.

f. Sale of EWA Assets

When storage capacity for EWA assets is not available or EWA assets are otherwise subject to loss, the Management Agencies may direct the Project Agencies to sell EWA assets which are not at that time pledged or identified for release under these Principles. No other benefits may be conferred to the EWA as a result of such sales. Any provisions for transfer or conveyance of assets sold or being sold shall not be governed by these principles. The proceeds of sale of EWA assets shall be accounted for and, to the extent provided by law, remain as EWA funds.

g. Coordination

The Management Agencies and the Project Agencies will hold regular meetings to share information and ideas and will coordinate their respective activities to optimize the implementation of the EWA.

h. Coordinated Operations Agreement

The Project Agencies shall continue to adhere to the general sharing principles contained in the 1986 Coordinated Operations Agreement (COA) as modified by interim operating agreements to reflect changes in regulatory standards, facilities, and operating conditions, including the EWA.

Implementation of the EWA shall not establish precedents for future negotiations or modifications of the COA. Future negotiations or modifications of the COA shall not inhibit effective EWA implementation.

2. EWA Shall Cause No Reduction in Project Deliveries

a. Except Where Contractor Agrees

The principles under this Article shall all be subject to the qualification that reductions in deliveries shall be allowed where the affected contractor or contractors agree to them, as in the case of source-shifting agreements.

b. No Harm To Deliveries Principle

The intent of the EWA is to provide substantive fishery protections by taking advantage of project flexibility. The use of EWA assets to compensate for operational curtailments shall not change the timing, location, or amount of water deliveries the projects would have made to its users operating under the Regulatory Baseline in the absence of the EWA. Reference in these Principles to “reductions in deliveries” shall include only uncompensated changes in timing, location, or amount of deliveries. In the operation of the EWA, it is the intent of the Project Agencies and Management Agencies to minimize water quality impacts associated with EWA operations.

i. “Operational Curtailment”

An operational change at the Delta CVP/SWP facilities, pursuant to the Management Agencies’ request, that causes a reduction in Project south-of-Delta water exports beyond the regulatory baseline for existing facilities as established in the Record of Decision, is referred to in these Principles as an “operational curtailment.”

ii. Identification of Asset For Release

At the time of every operational curtailment, the Management Agencies must identify an asset sufficient to provide replacement water for any potential reductions in deliveries to contractors. When necessary to ensure no reductions in deliveries, such EWA assets shall be released to the Projects to allow delivery in the same amount and at the same time and place as the foregone export.

iii. Time of Release of Asset

Except when project water is borrowed, the EWA asset identified for release to the affected project shall be released no later than the time the proposed operational curtailment is implemented. “Released” means that the asset becomes available to and the unconditional property of the affected project or its designee and is no longer held for EWA purposes.

iv. Delta Smelt Export/Flow Ratio

The reduced exports necessary to achieve the annual spring 2:1 Vernalis- flow-to-Project-export ratio required by the 1995 USFWS biological opinion for Delta smelt shall be provided from either EWA assets and/or CVPIA Section 3406(b)(2) yield dedication.

v. Cross Channel Gate Closure

Impacts on project deliveries of any closure of the Delta Cross Channel Gates pursuant to State Water Resources Control Board (SWRCB) Decision D-1641 or any future decision implementing those objectives in the SWRCB's 1995 Water Quality Control Plan allowing for discretionary Gate closure for fishery purposes shall be attributed to the Regulatory Baseline. Recognizing potential conflicts that may arise during dry conditions, the Project Agencies and the Management Agencies will ensure full consideration of all appropriate factors required for a decision based on the then-available best scientific data and evaluation, particularly including water supply, water quality, and endangered species as well as tradeoffs. The EWA shall compensate the Projects pursuant to these principles when the Management Agencies advise Reclamation to close the Gates for a time outside such regulatory baseline conditions and such closure leads to export reductions.

c. Borrowing; No Reduction in Deliveries

The EWA may borrow water from the SWP or CVP to achieve fishery protections upon their approval, provided that such borrowing will not result in any reduction in deliveries. Borrowing against EWA assets shall cause no reduction in deliveries in the year of borrowing or in the subsequent water year.

i. Identification and Pledge of Asset As Collateral

When the Management Agencies borrow project water to implement an EWA fishery action, they shall identify and pledge as a guaranty collateral sufficient to provide replacement water for any potential reductions in deliveries to contractors in the same amount and at the same time as the borrowed water would have been delivered.

ii. Sufficiency

The Project Agencies shall assess sufficiency of the collateral, in part, on the likelihood that the borrowed water will be replaced naturally by virtue of the wetness of the year. Thus, foreseeing favorable hydrology, collateral need not be in existence at the time of borrowing, but may consist of the EWA's ability to provide replacement water with later-acquired assets to assure no reduction in project deliveries should actual circumstances turn out to be different from those foreseen.

iii. Project Allocations and Deliveries

When project water has been borrowed from storage, project allocation and delivery decisions shall be made as if the water had not been borrowed.

iv. Disencumbering of Collateral or Release of Asset

Each borrowing transaction shall explicitly describe the conditions upon which the identified collateral will either be disencumbered or released to project water supply. “Disencumbered” means no longer serving as collateral subject to release under the borrowing transaction.

v. “Year”

Unless otherwise indicated, as used throughout these Principles, “year” means “water year”, beginning on October 1 and ending on September 30.

vi. Project Borrowing From EWA

The projects may borrow from EWA assets on the condition the borrowed water shall be repaid when or before the EWA needs it to cover an operational curtailment.

d. Use of Excess Capacity

The EWA shall be entitled to use excess capacity in SWP or CVP conveyance facilities, on an equal priority with Level 4 acquisitions mandated by the CVPIA.

i. “Excess Capacity”

“Excess capacity” means capacity available after project operational requirements and contract commitments have been met. In the case of the SWP, it also means after any wheeling for SWP contractors and any wheeling of CVP water for delivery to federal contractors for whom the SWP has traditionally wheeled water: San Joaquin National Cemetery, Musco Olive Co. and the users of the Cross Valley Canal.

ii. Exception to the Principle

There is one exception to the general principle that the EWA shall cause no reduction in project deliveries, and to the specific principle that only the excess of the SWP’s current conveyance capacity is available to the EWA: the SWP’s equal sharing with the EWA of b(2) and ERP upstream releases that the SWP could otherwise have pumped and used itself. This sharing is one of the EWA tools.

e. Banking in Project Reservoirs

EWA assets may be stored, or “banked”, in project reservoirs upstream of the Delta and in San Luis Reservoir, provided the Projects do not incur any additional adverse operational impacts.

i. Priority of EWA to Project Storage

Unless the Management Agencies and the Project Agencies make other arrangements, EWA assets will have a lower priority for storage space in project reservoirs than regular project storage and thus will be released first. Regular project storage includes reservoir operations for project purposes, such as flood control, downstream temperature control, minimum downstream flows for fish, regulatory requirements, and contract water supply including contractor carryover water.

SWP Use of Federal Share of San Luis. Pursuant to Supplemental Agreement No. 1 for the Operation of the San Luis Unit, during the term of this Principles Agreement, the CVP shall give precedence to EWA water for storage in the unused share of San Luis Reservoir. The CVP shall agree to allow the SWP to use its share of storage in San Luis Reservoir only to the extent that such use does not impair operation of the EWA.

ii. Protocols or Standards For Storage, Spill, and Loss of EWA Water In Upstream Project Reservoirs

In light of the difficulty and complexity of accounting for the storing of other than regular project water in a multi-purpose reservoir, the Project and Management Agencies shall jointly establish reasonable and practical standards or protocols for determining when an EWA asset may be stored and when it would spill or be lost from upstream project storage.

iii. Consequential EWA Upstream Storage

Where an EWA asset is used to pay for an operational curtailment limiting the export of project stored water, the project water that remains in storage as a consequence shall become an EWA asset. The conversion of project water to EWA water shall occur only to the extent that EWA storage could otherwise have taken place within the regular project operational and regulatory constraints of the reservoir, to be determined in accordance with the protocols and standards developed by the affected Project Agency.

f. Agreement on Further Conditions and Requirements; Water Accounting

The Project Agencies and the Management Agencies shall enter into an agreement that further specifies, to the greatest degree practicable, the conditions and requirements upon which: assets are to be released to the projects to compensate for operational curtailments; borrowing may occur; collateral for borrowing is to be disencumbered or released; and water transfers and exchanges may take place. Provisions for forecasting EWA actions, accounting for EWA assets and for all project water impacted by the EWA, including impacts to coordinated CVP/SWP operations, should be included in this agreement.

3. No Increased Costs

EWA shall impose no net, increased incremental costs upon the projects. The Management Agencies and Project Agencies shall develop a financing plan to cover all costs of the EWA from non-contractor funding sources. The plan may include the establishment of a revolving account with annual deposits to pay for fluctuating EWA costs. The plan shall address increased Project operating costs, both power and ancillary costs, of both the SWP and CVP resulting from implementation of the EWA; crediting the EWA as appropriate for reduced operating costs; crediting the EWA for certain power benefits; and revenues realized from the sale of EWA assets. The Management Agencies and Project Agencies shall develop and recommend this plan, including any necessary legislation, to the CALFED Policy Group within 90 days following the adoption of the ROD.

Considering the importance of acquiring water to the success of the EWA, the Project Agencies and Management Agencies shall meet and confer to develop alternatives for funding power and other incidental EWA costs, if such costs interfere with the successful operation of the EWA.

4. The EWA Shall Be Responsible For Mitigating Its Water Quality, Water Rights, and Environmental Impacts As Required By Law

**Article III
Description of the EWA Tools**

The following are the EWA tools for acquiring and using alternative sources of project water supply to offset the effects of operational curtailments imposed under the EWA program so that project deliveries will not be affected. While the requirements have been described in Article I (Establishment), any additional tools or arrangements that are determined to be beneficial to the EWA may be acquired at the discretion of the Management Agencies and Project Agencies.

1. Acquisition of Water for the EWA

a. Purchases

The Project Agencies (who are initially designated to undertake the purchases of EWA assets) will use EWA funds to purchase EWA assets from willing sellers both upstream and south of the Delta. "South of the Delta" means the export service areas served by the projects' Delta pumping plants, and may include Project contractors. "Upstream of the Delta" includes the legal Delta itself, as well as all tributaries to the Delta. Purchases can include leases, options, long-term agreements, and any other property or contractual transaction that makes alternative project water supplies available south of the Delta or available for conveyance to south of the Delta. In addition to direct diversion and stored water supplies, purchases will include the acquisition of storage space in both surface reservoirs and groundwater basins to bank EWA assets.

Explicit provision will be made in the purchase transaction for calling upon the asset and releasing it to provide water to replace project deliveries as needed to offset the impact of an EWA operational curtailment. The Agencies will coordinate EWA water acquisition with Level 4 refuge water acquisitions to ensure the priority accomplishment of both each year.

b. Delta Operations

There are four tools involving Delta project operations under which EWA water assets are to be acquired.

i. Sharing of b(2) and ERP Water Pumped by the SWP

The SWP and the EWA will share, on a 50-50 basis, water:

- (1) which has been released from storage or is otherwise made available for upstream purposes

under either CVPIA Section 3406(b)(2) or the ERP and arrives in the Delta with no further ERP or b(2) purposes to serve;

(2) which exceeds the export capacity of the CVP Tracy pumping plant;

(3) for which the SWP and EWA both have demand south of the Delta; and

(4) which the SWP has capacity to pump.

Pumping of b(2) or ERP water where either the SWP or the ERP is demand-limited south of the Delta (i.e., there is no place for the water to go) will not count against the 50% share of the one which does have demand for the water.

ii. Joint Point: SWP Wheeling of CVP and EWA water

The SWP will use excess capacity it may have at its Banks pumping plant to pump water for both the CVP and the EWA, to be shared between them on a 50-50 basis. The CVP water could be either from storage or under its Delta water rights to divert unstored water. The EWA water could be either from non-project water acquired north of the Delta, or stored or unstored water pumped under CVP or SWP water rights. If either the CVP or EWA is demand-limited, the other's use of joint point will not count against its 50% share.

"Joint Point" is a term that is used in recent SWRCB Delta proceedings and decisions (e.g., WR 95-6; WR 98-9; D-1641) to refer to the ability of the SWP and CVP to utilize each other's point of diversion in the south Delta, i.e., their points of diversion may be used "jointly". It is used here, however, in a slightly different way, to refer to the use (mainly) of the SWP point of diversion *alone*; and, specifically, to the wheeling of EWA as well as CVP water.

Use of excess capacity for the EWA, CVP, and Level 4 refuge water will take precedence over all other non-project pumping, except, as noted above, for wheeling water to respond to facility outages and wheeling to supply CVP contractors for whom the SWP has traditionally wheeled CVP water, namely, San Joaquin National Cemetery, Musco Olive Co. and the users of the Cross Valley Canal.

iii. SWP Appropriation of Unregulated Flow

The SWP may use its own Delta diversion rights to pump water from the Delta for EWA purposes when the SWP has capacity but no demand. It would be used in cases where Joint Point could also be used but where it would be preferable to create EWA assets south of the Delta to offset SWP rather than CVP losses to operational curtailments. As an adjunct to Joint Point, it would simply utilize SWP rather than CVP water rights to pump excess flows for the EWA's share. It would not affect the CVP's own share of excess SWP capacity.

iv. Project Pumping Made Possible by Regulatory Relaxations

(A) Relaxation of the Section 10 Constraint

The SWP is limited under Section 10 of the Rivers and Harbors Act, pursuant to US Army Corps of Engineers (Corps) Public Notice 5820-A, to a three-day average rate of diversion of water into Clifton Court Forebay of 13,250 acre-feet per day. This is equal to

an average, around-the-clock diversion rate of 6,680 cfs. (That rate may be increased during winter months when the San Joaquin River flow is above 1,000 cfs.)

Permission has been obtained from the Corps to increase the base diversion rate by the equivalent of 500 cfs to 7,125 cfs for the months of July, August, and September, through 2002. This 500 cfs will be dedicated in its entirety to pumping for the EWA.

(B) Relaxation of the Export/Inflow Ratio

Under D-1641, and anticipated under the SWRCB order to be issued upon completion of the Bay-Delta water rights hearing, project exports are limited at different times of the year to a certain percentage of Delta inflow (usually either 35% or 65%). This limitation is called the Export/Inflow, or E/I, ratio. Both D-1641 and the 1995 Water Quality Control Plan, consistent with the 1994 Principles for Agreement (Bay-Delta Accord), allow for these ratios to be relaxed upon the meeting of certain requirements.

Relaxations of the E/I ratio will be sought as appropriate and used to create EWA assets south of the Delta.

2. Banking of EWA Assets

a. Generally

Generically, banking is the storing for later use of water that would otherwise be used or lost in the present. Water can be banked and used within the same water year or carried over for use in a subsequent water year. Even though the acquisition of stored water does not carry the idea of converting a transitory asset into a durable asset, it is included here as an EWA banking transaction as well as a species of EWA asset acquisition. Like the acquisition of assets, banking transactions must provide for access to and the release of the stored EWA assets to the projects.

Priority of EWA assets in storage generally will turn on the provisions of the banking document. Usually, if imported water is physically stored in a groundwater basin, it will have a first and exclusive right to the water stored. If EWA water is stored in a surface reservoir, it usually will be junior to other rights and will spill first.

Banking EWA water south of the Delta should have the highest priority in importance, in that it creates assets which are both durable and which may be released without the ability to move water from the Delta being an issue.

b. Banking in Project Reservoirs

EWA water may be stored in project reservoirs upstream of the Delta as well as in San Luis Reservoir, with a lower priority than regular project water. The EWA will share this storage priority with water acquired for Level 4 refuge needs.

c. Source-Shifting Agreements

The purpose of water banking is to have water available for use at a time other than its original availability. Source-shifting agreements fall under this functional definition of “banking”. Source-shifting (or “demand-shifting”) agreements are agreements with a water agency, like MWD, which are able, at certain times, to call on non-Delta sources of water to temporarily create an asset for use by the EWA. These assets can be used for EWA operational curtailments. Replacement of the source-shifted water occurs at an agreed-upon subsequent time without any incremental impacts to the Projects.

3. Borrowing

Borrowing of project water, specifically water in San Luis Reservoir, is a tool intended to enhance the effectiveness and use of EWA assets. Project water in San Luis Reservoir may be borrowed to support an operational curtailment in lieu of immediately releasing an EWA asset, where the borrowed water is not needed at that time to make project deliveries, to avoid water quality and supply problems associated with the San Luis low point, or to satisfy reasonable carryover storage objectives.

An appropriate EWA asset will be pledged to assure that, if the borrowed water is not otherwise made up, release of the pledged asset will cause project deliveries not to be affected by the borrowing transaction.

4. Transfers and Delta Conveyance

Transfers will be used mainly to create assets south of the Delta out of assets upstream of the Delta. They can also be used to make acquisitions south of the Delta suitable for release to project use, where a change in the legal place or purpose of use or point diversion of the water is needed.

IV. Additional Provisions

1. Contingent on Appropriation or Allotment of Funds

The expenditure or advance of any money or the performance of any obligation of the United States or the State of California under this Agreement shall be contingent upon appropriation or allotment of funds. No liability shall accrue to the United States or the State of California for failure to perform any obligation under this Agreement in the event that funds are not appropriated.

The project schedules described in this document depend upon certain assumptions about state and federal budgets, optimized construction schedules, willing sellers and other contingencies. These assumptions may change as the CALFED Program progresses and appropriate revisions to

the CALFED Program may be necessary. Consistent with federal law, nothing in this document constrains the discretion of the President or his successor from making whatever budgetary or legislative proposals he or his successors deem appropriate or desirable.

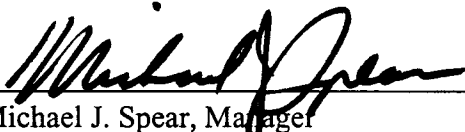
2. Modification Only By Written Agreement

The terms of this EWA Operations Principles Agreement may be modified by written agreement executed by all parties.

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt these Principles.

Signed and dated:

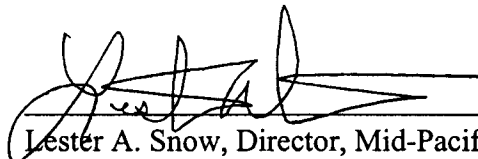
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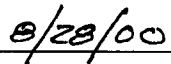
Michael J. Spear, Manager
California-Nevada Operations
U.S. Fish and Wildlife Service



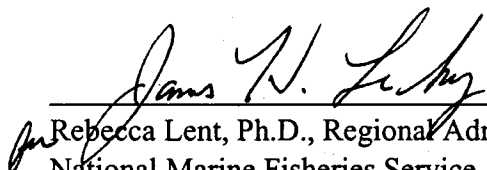
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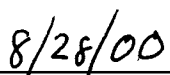
Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation



Date




Rebecca Lent, Ph.D., Regional Administrator
National Marine Fisheries Service




Date

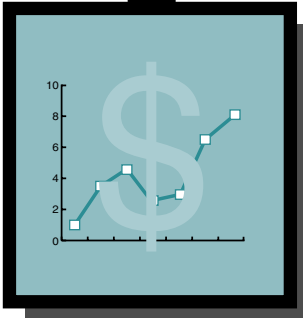
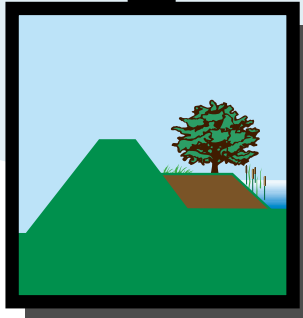
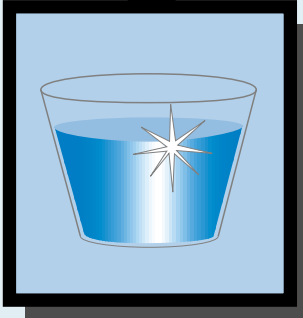
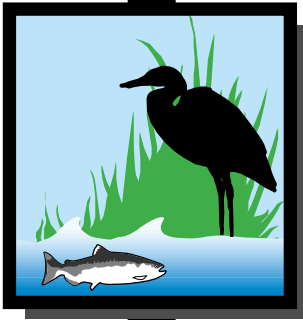
State of California


Thomas M. Hannigan, Director
California Department of Water Resources

8/28/2000
Date


Robert C. Hight, Director
California Department of Fish and Game

6/28/00
Date



CALFED
BAY-DELTA
PROGRAM

Attachment 3 Implementation Memorandum of Understanding

August 28, 2000

**CALFED Bay-Delta Program
Implementation
Memorandum of Understanding
Outline**

- A. Recitals
- B. Definitions
- C. Implementation Principles
- D. CALFED Governance and Implementation Procedures
- E. Annual Report
- F. Cost Crediting
- G. Ecosystem Cost-Share Agreement
- H. Contingent on Appropriation of Funds and Future Actions
- I. Legal Consistency
- J. Modification
- K. Term of MOU
- L. Signature in Counterparts

Attachment A -- Description of Oversight, Management and Support Responsibilities

Attachment B -- Oversight, Management and Support Responsibilities for Program Elements

Attachment C -- Table 1, Category A and B State and Federal Programs

Attachment D -- Operations Decision-Making Process

Attachment E -- CALFED Science Program

The following State and Federal agencies (collectively, the CALFED Agencies) enter into this Memorandum of Understanding (MOU) on August 28, 2000. Other State or Federal agencies may execute the MOU after its effective date. Upon the execution of this MOU by additional agencies, those agencies shall become a party to this MOU and no amendment executed by the other parties is required for the agencies to become a party.

UNITED STATES

Department of the Interior
Department of Agriculture
Bureau of Reclamation
Fish and Wildlife Service
U.S. Geological Survey
Bureau of Land Management
National Marine Fisheries Service
Environmental Protection Agency
Army Corps of Engineers
Natural Resources Conservation Service
Forest Service
Western Area Power Administration

STATE OF CALIFORNIA

Resources Agency
Department of Water Resources
Department of Fish and Game
Department of Food and Agriculture
Environmental Protection Agency
State Water Resources Control Board

The purpose of this MOU is to establish a cooperative interagency mechanism for implementing the CALFED Bay-Delta Program (CALFED Program) as defined in the August 28, 2000, Record of Decision (ROD). Unless and until a long-term governing structure is established for the CALFED Program by legislation, the CALFED Agencies will use this decision-making processes and governance structure described in this MOU, and will assume the Agency obligations described in this MOU to implement the CALFED Program. Specifically, this MOU is intended to delineate:

- C Principles for Implementation
- C Roles of the Policy Group and the Program Staff
- C Implementation procedures and decision-making processes
- C Responsibilities of signatory State and Federal agencies
- C Role and process for public and local involvement
- C Integration of science in the CALFED Program
- C Coordination of water project operations
- C Cost sharing agreements for implementation
- C Reporting requirements
- C Term of the MOU

A. Recitals

1. This MOU recognizes the:
 - C Critical importance of the Sacramento/San Joaquin River Delta-San Francisco Bay (Bay-Delta) estuary and its tributary watersheds to the natural environment and the economy of California and the nation.
 - C Multiple and complex resource management issues that need to be addressed to restore and enhance the Bay-Delta estuary.
 - C ROD issued by the State and Federal agencies is the Programmatic plan for the long-term solution to address these complex resource management issues.
 - C Need for State and Federal agencies to continue to work closely together, and in partnership with stakeholders and Indian tribes, to successfully implement the ROD over 30 years.
2. In 1994, the Framework Agreement was signed between the Governor's Water Policy Council and the Federal Ecosystem Directorate (ClubFed) which set forth the operating principles for developing a long-term solution to the Bay-Delta problems. In December 1994, the State and Federal agencies and stakeholders signed the "Principles for Agreement on Bay-Delta Standards between the State of California and the Federal Government" (the Accord), which established interim measures for both environmental protection and regulatory stability in the Bay-Delta.
3. The State and Federal agencies developed the CALFED Bay-Delta Program in 1995 to develop the long-term solution to the Bay-Delta problems and prepare a Programmatic EIS/EIR. The State and Federal agencies formed the Policy Group (comprised of State and Federal agency leaders) to oversee and direct the preparation of the Programmatic EIS/R and development of the Preferred Program Alternative.
4. The State and Federal CALFED agencies have worked for over five years to develop a Final Programmatic EIS/EIR and Preferred Program Alternative in collaboration with representatives of agricultural, urban, environmental, fishery, business, rural counties, environmental justice, farm labor, Indian tribes and Delta interests.
5. The State and Federal administrations released *California's Water Future: A Framework for Action* on June 9, 2000 which sets out actions anticipated to be implemented as part of, or in conjunction with, the Preferred Program Alternative during the first seven years (Stage 1) of the CALFED Program.
6. On July 21, 2000, the lead CALFED Agencies released the Final Programmatic EIS/EIR and Preferred Alternative.

7. Contemporaneous with this MOU, the lead CALFED Agencies have executed a ROD and have certified the Final Programmatic EIS/EIR and Preferred Alternative.
8. The undersigned recognize that public agencies to this MOU have specific statutory and regulatory authority and responsibilities, and that actions of these public entities must be consistent with applicable procedural and substantive requirements. Nothing in this MOU is intended to, or shall have the effect of, constraining or limiting any public entity in carrying out its statutory responsibilities. Nothing in this MOU constitutes an admission by any party as to the proper interpretation of any provision of law, nor is anything in this MOU intended to, nor shall it have the effect of, waiving or limiting any public entity's rights and remedies under any applicable law.

The undersigned recognize that certain departments, boards, and commissions (Adjudicative Entities) have adjudicative responsibilities with respect to contested regulatory matters that are brought before them. (See California Gov. Code §§ 11400, et seq.) Such adjudicative responsibilities include the requirement that the Adjudicative Entity and its members avoid bias, prejudice, or interest in the adjudicative matters before them, e.g., they cannot decide the outcome of a matter before completion of any required hearing or equivalent proceeding. Some such Adjudicative Entities exist within the undersigned agencies. This MOU does not in any way require or commit an Adjudicative Entity to participate in proposing a project that will come before it for approval, nor does this MOU require or imply that an Adjudicative Entity will approve a project that requires an adjudicative proceeding. Under this MOU, the role of Adjudicative Entities in connection with matters that may require an adjudicative decision is limited to promptly and diligently processing any applications, petitions, or other requests for approval. Nothing in this MOU commits an Adjudicative Entity to an approval or disapproval of any project subject to the authority of the Adjudicative Entity, nor to a term or condition in any approval of a project by the Adjudicative Entity.

9. For the term of this MOU, the CALFED Agencies will rely on the interim governance structure and process described and agreed to in this MOU.

B. Definitions

The following defined terms, when they appear with initial capital letters, shall apply to this MOU.

Adjudicatory Entity: a State or Federal department, board, or commission that has adjudicative responsibilities with respect to contested regulatory matters that are brought before it.

Annual Report: the annual assessment and report as mandated in the ROD.

CALFED Bay-Delta Program (CALFED Program): the entire cooperative program of Federal and State agencies described in this ROD, including eight Program Elements and hundreds of subsidiary actions that will be implemented over a 30 year period.

CALFED Bay-Delta Program Staff (Program Staff): the collection of Federal and State staff members on assignment or detail to the CALFED Bay-Delta Program, paid with funds provided by the Agencies. This includes the Bay-Delta Program Executive Director and staff which are assigned responsibility for various CALFED Program oversight, coordination and management activities.

CALFED Agencies (Agencies): the State and Federal agencies that sign this MOU and will implement the CALFED Program, including California Resources Agency (Resources), Department of Fish and Game (DFG), California Department of Water Resources (DWR), Department of Food and Agriculture (DFA), California Environmental Protection Agency (CalEPA), State Water Resources Control Board (SWRCB), U.S. Department of the Interior (Interior), U.S. Bureau of Reclamation (Reclamation), U.S. Fish & Wildlife Service (USFWS), U.S. Geological Survey (USGS), Bureau of Land Management (BLM), U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS), U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), U.S. Forest Service (USFS), and the Western Area Power Administration (WAPA).

Category A and B Programs and Funding: Category A includes programs and funding that should be consistent with the CALFED Program objectives and priorities and submitted to Policy Group for review and recommended approval. Category B includes programs and funding that should be coordinated with the CALFED Program and shared with Policy Group for review and comment.

Community-Based Outreach: working at the community level to gain input in the implementation of the CALFED Program.

Cross-Cut Budget: the compilation of annual CALFED Agency budgets for Category A and B programs.

The Framework: the document entitled *California's Water Future: A Framework for Action*, issued on June 9, 2000.

Implementation MOU: this MOU between Federal and State agencies regarding their mutual governance of the CALFED Program.

Program Element(s): the eight sub-programs of the CALFED Program: ecosystem restoration, watershed, storage, conveyance, water transfers, water use efficiency, water quality, and levee protection.

Program Management/Program Manager: the direction and day-to-day management of one of the eight Program Elements, including development of Program priorities, annual and long-term workplans, Program Element budgets, and promotion of local and regional involvement in the Program Element.

Project Management: the direction and day-to-day oversight of an action or activity selected and assigned by the Program Manager.

C. Implementation Principles

- 1. Program Integration and Balance:** The Agencies will implement the CALFED Program in an integrated and balanced manner and will ensure that each Program Element shows continuous improvement.
- 2. Consistency and Support for CALFED Program:** The Agencies will support the implementation of the CALFED Program as described in the ROD. The Agencies will support and implement actions consistent with the ROD. An Adjudicative Entity that is a CALFED Agency will conduct an independent review of any CALFED action or proposal that requires the approval of the adjudicative entity under State and Federal law to the extent that such actions are consistent with the entity's authorities and responsibilities.
- 3. Agency Coordination:** The Agencies will coordinate their activities which implement the CALFED Program including budget planning, funding, project implementation, scientific development and review, and assessment of the CALFED Program to the extent authorized by law.
- 4. Financing:** The Agencies will seek the necessary funding and resources to support the implementation of the CALFED Program as described in the ROD, consistent with their existing authorities. Funding will be subject to State and Federal legislative action and specific agency authority.
- 5. Public Involvement:** The Agencies will encourage public knowledge of, and active and strong involvement in, the implementation and evaluation of the CALFED Program. The Agencies will establish a broad public advisory committee for this purpose.
- 6. Tribal Involvement:** The Agencies will encourage tribal knowledge of, and active and strong involvement in, the implementation and evaluation of the CALFED Program. The Policy Group will invite a Tribal Representative to attend meetings of the Policy Group. The Tribal Representative will be designated by the consensus decision of an organization of recognized tribes in California. The purpose of the Tribal Representative is to enhance communication between CALFED agencies and tribes that may be affected by decisions implementing various aspects of the CALFED Program. Federal agencies participating on the CALFED Policy Group will consult with appropriate tribes before significant Policy Group decisions on matters potentially affecting tribal interests.

7. **Local Implementation:** The Agencies will promote active and strong involvement of local communities during implementation.
8. **Environmental Justice:** Consistent with the President's Executive Order 12898 and California Public Resources Code section 72000, the Agencies will seek fair treatment of people of all races, cultures, and incomes. CALFED programs, policies and actions shall not cause any segment of the population to bear a disproportionately high or adverse health, environmental, social, or economic impact. CALFED Agencies agree to be responsible for ensuring this policy is carried out across all Program Elements through the development of environmental justice goals and objectives.
10. **Science-Based Adaptive Management Approach:** The Agencies will implement the CALFED Program using a science-based adaptive management approach. This approach will rely on constant monitoring and evaluation of actions in all Program Elements. The CALFED Science Program will provide information to guide management decisions for CALFED Program actions, and CALFED related actions.
11. **Single Blueprint for Ecosystem Restoration:** The Agencies will develop a single blueprint for implementing the Ecosystem Restoration Program. The blueprint is a unified and cooperative approach made up of integrated science, a shared vision for a restored ecosystem, and a management framework which defines the process for implementing the blueprint.

D. CALFED Governance and Implementation Procedures

Until a long-term governing structure is established, the Agencies intend to continue the current Policy Group structure with modifications to implement the CALFED Program.

1. CALFED Policy Group

Policy Group Membership: Each agency signing this MOU is a member agency of the Policy Group. Each member agency of Policy Group will identify a representative and alternate for participation in Policy Group meetings. The Secretary of the Interior (or designee) or the Secretary for Resources (or designee) will chair the meetings unless the President or the Governor identifies another member of his cabinet to lead his administration's CALFED efforts.

The membership, alternates and co-chair information will be kept on file by the Program Staff.

Numerous agencies with activities related to CALFED objectives may wish to participate in CALFED activities but may not wish to become members of the Policy Group. Coordination with those agencies will be initiated or continued, and separate coordinating agreements will be established when needed.

Policy Group Responsibilities. The Policy Group will be responsible for overseeing implementation of the CALFED Program to ensure the CALFED Program objectives and targets identified in the ROD are achieved. The overarching mandate of the Policy Group will be to assure effective, balanced, coordinated, and timely implementation of all Program Elements. Existing Agencies retain all regulatory authority and responsibilities. The Policy Group will provide program oversight and coordination of the implementation of the CALFED Program. Policy Group responsibilities are described in *Attachment A* and summarized below.

- C Oversee CALFED Program implementation
- C Assess CALFED Program progress in reaching objectives
- C Review and recommend approval of Category A priorities, workplans and budgets
- C Coordinate Agency and Program Elements
- C Review and coordinate related programs
- C Provide public outreach and communication
- C Communicate with the State and Federal legislatures for CALFED Program as a whole, consistent with State and Federal law
- C Report and track CALFED Program implementation

Policy Group Meeting Requirements/Quorum: The Policy Group will meet a minimum of four times a year, including at least once a year with the public advisory committee. The State and Federal co-chairs will alternate chairing of meetings. Both co-chairs or their alternates must be in attendance in order for the Policy Group to meet. Two-thirds of the State Policy Group members, two-thirds of the Federal Policy Group members and both co-chairs (or their alternates) constitute a quorum for transaction of any business by the Policy Group.

Policy Group Decision Rule: While the Policy Group has no authority to make decisions that would require an agency to exceed its statutory authority or restrict an agency's statutory discretion, the CALFED Agencies agree to follow the process described in this MOU. Policy Group actions require State and Federal consensus. The consensus rule requires that the State and Federal co-chairs reach agreement before an action can be taken by the Policy Group. The State and Federal co-chairs will discuss the State and Federal positions both within their respective caucuses and with each other before the Policy Group takes any action.

Policy Group Subcommittees: The Policy Group can create work groups and subcommittees as needed to carry out its responsibilities.

2. Program Staff.

The CALFED Program was established to develop a long-term comprehensive plan for the Bay-Delta System. The plan has been completed with the execution of the ROD. The CALFED Agencies support the continuation of the CALFED Program Staff for the implementation phase of the CALFED Program. The Governor, subject to concurrence by the Secretary of the Interior, will appoint an Executive Director of the Bay-Delta Program, who will hire staff as needed to support the responsibilities assigned to the Program Staff.

Program Staff Responsibilities: The Program Staff, under the direction of the Policy Group and in coordination with the Agencies will:

- C Provide the necessary staff support for the Policy Group.
- C Provide oversight of, and coordination among, Agencies responsible for managing and implementing each Program Element, and ensure integration and coordination is occurring between Program Elements.
- C Manage the Comprehensive Reporting System.
- C Draft the Annual Report.
- C Manage legislative outreach on behalf of the Policy Group.
- C Manage public, regional, and tribal involvement, including providing the necessary staff support for the public advisory committee.
- C Work with State and Federal agencies, to the extent provided by law, to coordinate an annual budget for CALFED implementation that any Agency may submit as part of its budget review and approval process.
- C Prepare an annual Cross-Cut Budget after the State and Federal budgets have received the respective legislative and executive approvals.
- C Prepare an annual Program Staff budget and workplan which will be reviewed and approved by the Policy Group.
- C Provide Program Management of the Ecosystem Restoration Program, Water Quality Program, Watershed Program and Water Transfers Information Clearinghouse, as assigned by Agencies that receive funding for such activities.
- C Manage the CALFED Science Program, under the leadership of a Lead Scientist.
- C Manage the permit clearinghouse as established by the MOU now planned for execution by the CALFED Agencies by December 2000.
- C Develop and oversee the implementation of the Water Management Strategy.

The Program Staff may be assigned additional responsibilities by the CALFED Policy Group, but no Program Staff actions will supplant any action or decision required by law to be performed by a CALFED Agency.

Funding for Program Staff: To the extent authorized and appropriated, the State and Federal CALFED Agencies agree to share equally (50% State and 50% Federal) the cost to support the annual budget for the Program Staff, subject to annual Policy Group approval. DWR and Reclamation will assume primary responsibility for administering and funding the Program Staff budget. Such allocations of support shall include the direct and indirect costs of assigning personnel to the Program Staff.

3. Program Element Management

To effectively implement the CALFED Program, the management of each Program Element has been assigned to one or more CALFED Agencies or the Program Staff. *Attachment A*, which is incorporated into this MOU, describes the oversight, management, and support functions. *Attachment B*, also incorporated in this MOU, describes the assignment of those responsibilities for each Program Element.

For Program Elements in which the Program Staff is assigned management responsibility, CALFED Agencies will retain and exercise their statutory authorities. Program Management by the Program Staff does not suggest any delegation of an agency's authority to the Program Staff.

Program Staff or Agencies assigned the responsibility for management of Program Elements agree to coordinate with appropriate agencies and operate under the oversight of the Policy Group to ensure consistency with the CALFED Program plan and objectives as described in the ROD.

4. Planning, Budget and Implementation Procedures

Program and Funding Categories: Programs and funding subject to Policy Group recommended approval or coordination are divided into two categories, Category A and B. Attachment C, Table 1 includes an initial list of existing Category A and B programs and funding. This Table shall be reviewed and revised as necessary by Policy Group. The addition of programs and funding to Category A will only be allowed upon concurrence by the agency with funding authority. Any revisions of this Table by the Policy Group do not require modification of this MOU pursuant to Section J.

- C ***Category A -- Consistent Programs and Funding:*** Includes those programs and funds that should be managed and implemented consistent with the CALFED objectives. Category A includes both long-term existing programs that should be managed consistent with CALFED objectives, and more recent funding and programs specifically targeted at CALFED objectives and actions.
- C ***Category B -- Related Programs and Funding:*** Includes those programs and funds that have related and overlapping program objectives and whose geographic area of focus overlaps with the CALFED solution area.

Category A Procedures: For Category A programs and funds:

- a. CALFED Agencies responsible for Program Management and/or implementation agree to coordinate with Program Staff and other CALFED Agencies to develop program priorities, workplans, proposed budgets, and significant program products (such as regulations, grant or loan solicitations, environmental documentation, project selection).
- b. When the Program Staff is assigned responsibility for Program Management it shall coordinate with appropriate agencies to develop Program priorities, workplans, proposed budgets, and significant program products (such as regulations, grant or loan solicitations, environmental documentation and project selection).
- c. CALFED Agencies or the Program Staff, as appropriate, shall then submit Program priorities, workplans, budgets and significant Program products to the Policy Group for review, recommended approval, and statement of consistency with the CALFED Program objectives.
- d. Final approvals will remain with those Agencies with the program and funding authority.

Category B Procedures: CALFED Agencies with authority for Category B programs and funding agree to:

- C Work with appropriate CALFED Agencies and the Program Staff in the development of Category B programs and projects
- C Share annual plan for programs and projects located in the CALFED solution area to the Policy Group to identify opportunities for coordinating resources and funding to increase efficiency, and to avoid duplication

Cross-Cut Budget Procedures: CALFED Agencies agree to participate, to the extent authorized by law, in the preparation of annual CALFED Cross-Cut Budgets. CALFED Agencies agree to provide funding information, to the extent authorized by law, to the Program Staff in a timely fashion for all programs and activities related to the CALFED Program. The Cross-Cut Budget will at a minimum include all Category A and B programs and funding.

5. Public and Local Involvement

The CALFED Agencies remain committed to encouraging the public to work with the Policy Group, State and Federal implementing agencies, and scientific and technical advisors in the design, implementation and evaluation of the CALFED Program. Public involvement in the CALFED Program will be provided through advisory committees and groups, public meetings and workshops, newsletters, and other publications that provide updated information. Consistent with the Federal Advisory Committee Act (FACA), the CALFED Agencies propose to provide public involvement through three levels of advisory groups:

- C Broad public advisory committee
- C Program Element work groups
- C Local work groups

Broad public advisory committee: The Secretary of the Interior will charter a public advisory committee to assist the Policy Group in its responsibilities of CALFED Program integration, coordination, balance and assessment. The advisory committee will meet as needed. Membership would include qualified representatives of Indian tribes and stakeholder groups. The advisory committee members would be selected based on their experience and expertise in relevant fields, such as ecosystem restoration, agriculture, hydrology, urban water management, fishery biology, water quality, flood management, water conservation and recycling, environmental justice, local government and economics. Appointments would be made to assure that the advisory committee as a whole is both balanced and diverse. Representatives of the Policy Group and CALFED Agencies would be charged with attending advisory committee meetings and providing the information and reports as the committee may request. The responsibilities of the advisory committee will include:

- C Advice on priorities, long-term plans, CALFED Program performance, balance and integration
- C Liaison between public work groups, subcommittees and the Policy Group
- C Creation of subcommittees and work groups, as needed and subject to Policy Group approval
- C Consideration of recommendations from subcommittees and local work groups

The Policy Group will provide information to the advisory committee explaining the reasons and basis for Policy Group decisions.

Program Element Work Groups: CALFED Agencies and the Program Staff will continue to rely on Program Element work groups in the refinement and implementation of the CALFED Program. The role of Program Element work groups would be to provide specialized technical or policy expertise for specific Program Elements. Membership would include individuals with technical/policy expertise pertinent to the Program Element, such as ecosystem restoration and drinking water quality experts from non-governmental organizations, tribes, water agencies, State and Federal agencies, and the public at-large. For example, the Delta Drinking Water Council, Ecosystem Roundtable, and Watershed Workgroup are Program Element work groups that will be needed during implementation.

Local Work Groups: CALFED Agencies and the Program Staff will establish local work groups, as needed, to provide forums to support Community-Based Outreach. Local work groups may represent specific geographic areas in the CALFED Solution Area, such as northern California, San Joaquin Valley, Delta/Bay Area, and southern California. Alternatively, they may represent various watersheds, basins or ecological zones within the CALFED Solution Area. Membership would include local government representatives, local non-governmental organizations, local tribal representatives, and others interested in, or affected by, the CALFED Program. As envisioned, responsibilities of the local work groups will include:

- C Effective communication/interaction with local governments and citizens
- C Liaison between local communities and CALFED Agencies
- C Local insight and advice on Program Element priorities and performance
- C Access for the local community to shape and help to implement the Program Elements of the CALFED Program

6. Water Project Operations

The CALFED Agencies involved in operations are: Reclamation, USFWS, NMFS, DWR, DFG, EPA, USACE, and WAPA. State and Federal agencies and stakeholders will continue to coordinate and resolve operations issues through a multi-step process. (See *Attachment D* diagram). This process is intended to:

1. Ensure full consideration of all appropriate factors required for a decision based on the then-available best scientific data and evaluation, particularly including water supply, water quality, and endangered species as well as tradeoffs.

2. Expedite the elevation of conflicts among these sometimes competing objectives.
3. Provide an “early warning,” to senior policymakers in the State and Federal governments.
4. Draw on stakeholder knowledge and creativity in resolving issues.

Most operational conflicts will be resolved at the operator or agency director level, but Policy Group members need to remain informed as conflicts develop. As conflicts arise, an “early warning” will be provided to the Governor and Secretary of Interior to expedite the resolution of conflicts. As conflicts develop, they will be referred first to the CALFED Operations Group (Ops Group). The Ops Group was established by the 1994 Framework Agreement and the CALFED Agencies will continue the Ops Group. The Ops Group will work with the CALFED Operations and Fish Forum (OFF) (formerly known as the “No-Name Group”), and technical subgroups. Ops Group will communicate decisions and remaining conflicts to the Water Operations Management Team (WOMT).

Environmental Water Account operations will be managed pursuant to the EWA Operating Principles Agreement.

The WOMT is a high level agency group which includes the directors of DWR and DFG, and the regional directors of Reclamation, USFWS, NMFS and EPA. The WOMT will meet as the need arises to resolve conflicts among competing resource demands. As the WOMT resolves issues, it will explicitly consider water supply, water quality, and fishery impacts, as well as energy resource impacts in its decisions, and through the Ops Group, inform the public, stakeholders, and the legislature of the decision and basis for the decision. Nothing in this MOU is intended to prevent any CALFED Agency from carrying out its statutory duties.

7. Science

The purpose of the CALFED Science Program is: (1) to provide a comprehensive framework for developing new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the CALFED Program (including all Program Elements); and (2) to communicate to managers and the public the state of knowledge of issues critical to achieving CALFED goals. The scope of the CALFED Science Program will include scientific information necessary for the CALFED Program and for State and Federal water operations. Specific objectives include:

- C Provide a comprehensive and integrated scientific context for CALFED activities
- C Ensure continuous advancement of credible scientific information that will guide regulatory decisions, adaptive management, and water project operations
- C Establish a framework to identify and articulate areas of scientific uncertainty relevant to key issues both before and after actions
- C Develop strategies to reduce uncertainties and track performance and progress toward CALFED goals

The work described in the Comprehensive Monitoring, Assessment, and Research Program (CMARP) technical appendix (Final EIS/EIR, July 2000) is now under the direction of the CALFED Science Program.

Attachment E, included within this MOU, describes the responsibilities and structure of the CALFED Science Program.

E. Annual Report

The CALFED Policy Group will submit an Annual Report to the Governor, the Secretary of the Interior, Congress, the California Legislature, and other interested parties that describes the status of implementation of the CALFED Program. Prior to November 15 of each year, the Policy Group, in consultation with other interested persons and agencies, will review the progress in meeting the implementation schedule established in the final programmatic EIS/EIR and ROD, and the progress in meeting CALFED Program objectives and targets.

The Annual Report will be submitted by December 15. The report will include a status report on all actions taken to meet CALFED objectives, as described in the ROD.

F. Cost Crediting

State and Federal agencies and stakeholders have contributed, and will continue to contribute, funds to support the CALFED Program. Crediting for costs incurred for CALFED programs or actions will be addressed as cost allocations are determined for specific programs or actions.

G. Ecosystem Cost-sharing Agreement

The Department of Interior and the Resources Agency agree that the *Agreement for Cost Sharing Related to Restoration Under Proposition 204 and the Bay-Delta Act*, dated January 28, 1998 (“Ecosystem Cost Sharing Agreement”), shall remain in effect unless modified or terminated by the parties thereto under the terms of that Agreement. The Department of Interior and the Resources Agency confirm that the Ecosystem Cost Sharing Agreement satisfies the requirements of Proposition 204, as codified in Water Code section 78684.10, which requires a cost-sharing agreement between the State of California and the United States prior to the expenditure of the \$390 million appropriated for ecosystem restoration. Pursuant to paragraph II(D)(1)(a) of the Ecosystem Cost Sharing Agreement, the Secretary of the Interior and the Secretary for Resources approve the inclusion of the sources of funding listed under paragraph II(B)(2) of that agreement. The Department of Interior and the Resources Agency intend to amend the Ecosystem Cost Sharing Agreement by December 31, 2000 provided both parties have the authority to do so.

H. Contingent on Appropriation of Funds and Future Actions

The expenditure or advance of any money or the performance of any obligation of the United States under this MOU shall be contingent upon appropriation or allotment of funds in accordance with 31 USC 1341(Anti-Deficiency Act). No liability shall accrue to the United States or the State of California for failure to perform any obligation under this MOU in the event that funds are not appropriated or allotted.

The project schedules described in this document and the ROD depend upon certain assumptions about State and Federal budgets, optimized construction schedules, willing sellers, and other contingencies. These assumptions may change as the CALFED Program progresses and appropriate revisions to the CALFED Program may be necessary. Consistent with Federal law, nothing in this document or the ROD constrains the discretion of the President or his successors to make whatever budgetary or legislative proposals he or his successors deem appropriate or desirable.

The commitments and obligations under this MOU of the State of California are subject to the availability of appropriated funds. No liability shall accrue to the State of California for failure to perform any obligation under this MOU in the event that funds are not appropriated.

I. Legal Consistency

All provisions of this MOU are intended and shall be interpreted to be consistent with all applicable provisions of State and Federal law.

J. Modification

This MOU can be modified if agreed to in writing by all parties hereto.

K. Term of the MOU

This MOU shall expire on September 30, 2003 unless terminated or extended by written agreement of all parties hereto.

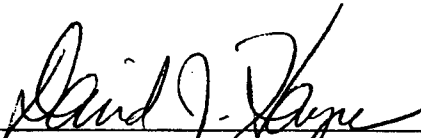
L. Signature in Counterparts

This MOU may be executed in counterparts.

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt this Implementation Memorandum of Understanding. By signing this document together, we exercise our respective authorities over only those portions relevant to our authority.


Signed and dated:

United States of America



David J. Hayes, Deputy Secretary of the Interior
U.S. Department of the Interior

8/28/00
Date



Richard E. Rominger, Deputy Secretary
U.S. Department of Agriculture

8.28.00
Date

Michael J. Spear, Manager
California-Nevada Operations
U.S. Fish and Wildlife Service

Date

Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation

Date

John D. Buffington, Regional Director
U.S. Geological Survey

Date

Al Wright, Acting State Director
U.S. Bureau of Land Management

Date

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Signed and dated:

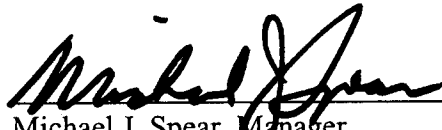
United States of America

David J. Hayes, Deputy Secretary of the Interior
U.S. Department of the Interior

Date

Richard E. Rominger, Deputy Secretary
U.S. Department of Agriculture

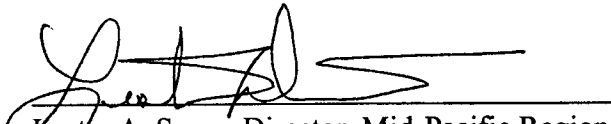
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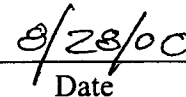
Michael J. Spear, Manager
California-Nevada Operations
U.S. Fish and Wildlife Service




Date



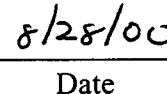
Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation




Date



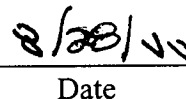
John D. Buffington, Regional Director
U.S. Geological Survey



Date



Al Wright, Acting State Director
U.S. Bureau of Land Management



Date



Felicia Marcus, Regional Administrator
U.S. Environmental Protection Agency

8/28/00

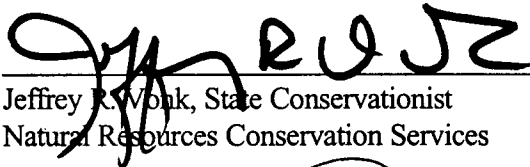
Date



Brigadier General Peter T. Madsen, Commander
South Pacific Division
U.S. Army Corps of Engineers

28 Aug 00

Date



Jeffrey R. Wink, State Conservationist
Natural Resources Conservation Services

8-28-00

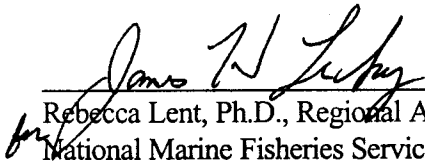
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Bradley E. Powell, Regional Forester
Pacific Southwest Region
U.S. Forest Service

8-28-00

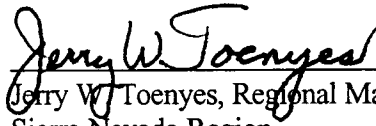
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Rebecca Lent, Ph.D., Regional Administrator
National Marine Fisheries Service

8/28/00

Date

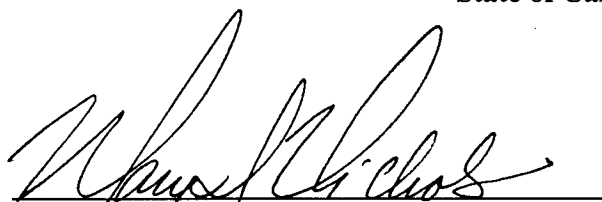


Jerry W. Toenyas, Regional Manager
Sierra Nevada Region
Western Area Power Administration

8/28/00


Date

State of California



Mary D. Nichols, Secretary
California Resources Agency

8/28/00
Date



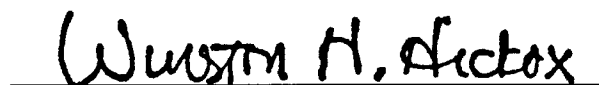
Thomas M. Hannigan, Director
California Department of Water Resources

8/28/2000
Date



Robert C. Hight, Director
California Department of Fish and Game

8-28-00
Date



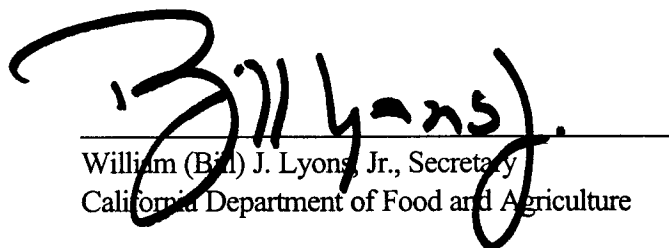
Winston H. Hickox, Secretary
California Environmental Protection Agency

8/28/00
Date




Edward C. Anton, Acting Executive Director
California State Water Resources Control Board

8/28/00
Date




William (Bill) J. Lyons, Jr., Secretary
California Department of Food and Agriculture

8-28/2000
Date



Barbara LeVake, President
The Reclamation Board

9/8/00
Date

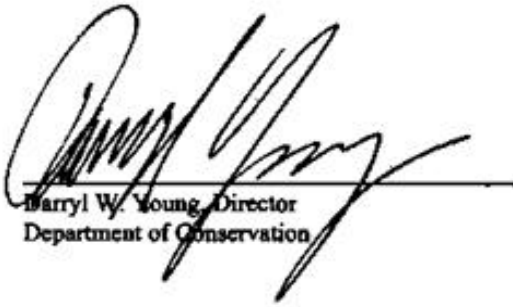


Diana M. Bonta, R.N., Dr.P.H., Director 4
California Department of Health Services

9/22/00
Date


Patrick N. McCarty, Chairman
Delta Protection Commission

9/28/00
Date


Barry W. Young, Director
Department of Conservation

9/25/01
Date

Attachment A

Description of Oversight, Management and Support Responsibilities

CALFED Program Oversight and Coordination

1. Oversight of CALFED Implementation: Policy Group and Program Staff will provide overall oversight and coordination for implementation of the CALFED Program to ensure balanced implementation, integration and continuous improvement in all Program Elements. Policy Group will develop policies and make recommendations regarding integration, coordination, and consistency for significant CALFED Program products for each Program Element. Program Staff will oversee and direct the CALFED Science Program and coordinate environmental compliance for the CALFED Program, and evaluate the status and efficacy of mitigation measures.
2. CALFED Program Assessment and Modification: The Policy Group will review and approve an annual performance assessment across all Program Elements prepared by Program Staff with agency, public, and scientific review by CALFED Independent Science Board and panels. Prior to submission to the Policy Group, the CALFED Independent Science Board will review the assessment for determination of whether the CALFED Program is achieving its objectives. The Policy Group will be responsible for modification, as needed, of CALFED Program goals and objectives which will be done in coordination with the appropriate agencies and with public input.
3. Recommend Approval of Category A Priorities, Workplans, and Budgets: The Policy Group will review annual and long-term priorities, workplans and proposed budgets for Category A Programs and funding in each Program Element and either recommend modifications or recommend approval and provide a statement of consistency. The Policy Group will review and recommend approval for significant program products throughout planning and implementation of the CALFED Program. Annual workplans will be submitted to the Policy Group after first being reviewed by the Executive Director and Program Staff.
4. Final Approval of Priorities, Workplans and Budgets: Agencies with funding authority will review and provide final approval of priorities, workplans, and budgets considering recommendations by the Policy Group.
5. Agency and Program Element Coordination: The Policy Group and Program Staff will provide coordination and facilitation between agencies, and coordination and integration between Program Elements to ensure CALFED Program objectives and schedules are being met. The Policy Group will mediate conflicts among agencies implementing the CALFED Program.

6. Review and Coordination of Related Programs: The Policy Group and Program Staff will provide for coordination (and integration as appropriate) of the CALFED Program with other related programs (including Category B Programs) to maximize available resources and reduce conflicts. The Policy Group will approve the CALFED Cross-Cut Budget prepared by the Program Staff. Policy Group will provide recommendations to the appropriate agencies on Program modifications needed to increase coordination with CALFED activities.
7. Public Outreach and Communication: The Policy Group and Program Staff will maintain contact and communications with the public and media regarding CALFED Program development, implementation, and performance.
8. Legislative Communication: Policy Group agencies, in coordination with the Bay-Delta Executive Director, will maintain contact and communications with Congress and the State Legislature regarding the status of CALFED Program development, implementation, and performance.
9. CALFED Program Reporting and Tracking: Program Staff will develop and manage a Comprehensive Reporting System which will provide status on expenditures, schedule, and meeting of objectives for each Program Element measured against established targets. The schedules will be set consistent with the Framework for Action and the ROD. Performance will be measured against cost, schedule and CALFED Program objectives. The reporting system will include information on expenditure and work progress on a regular basis from the implementing agencies and entities.

Program Element Management

Described below are the responsibilities of the Program managers for each CALFED Program Element. Program managers will only manage those Category A Programs where they have been assigned responsibility by this MOU and by the agency with funding authority. For example, Resources Agency has assigned responsibility for Ecosystem Proposition 204 funds to the Program Staff. In certain cases, Category A Programs will be managed by other agencies and not the Program Manager assigned to manage the Program Element. For example, the CVPIA programs listed in Category A should be managed consistent with CALFED objectives, but management responsibility will remain with USFWS and Reclamation. In these cases, the agencies with responsibility for managing Category A Programs will follow the review process described in this MOU and coordinate with Program Staff and appropriate Program managers.

1. Develop priorities, workplans and budgets: The Program manager(s) will develop Program Element priorities, workplans and budgets in coordination with appropriate agencies, Program Staff, the public, and technical and scientific resources. Program managers will submit proposed priorities, workplans, budgets, and significant program products to Program Staff for review and to the Policy Group for review, recommended approval and statement of consistency. Program Managers will work with Program Staff regarding environmental compliance/permit coordination and scientific aspects of each Program Element.

2. Propose projects and actions: The Program manager will 1) manage the solicitation and selection process for grants and loans and 2) submit proposed projects and actions to Program Staff for review and to Policy Group for review, recommended approval, and statement of consistency.
3. Implement projects and actions: The Program manager will: 1) oversee the implementation of the Category A projects and actions to ensure completion as proposed and, 2) provide regular status reports on projects and actions to Program Staff and Policy Group as part of Comprehensive Reporting System.
4. Program Element assessment: The Program manager will draft initial assessment of Program Element performance with appropriate agencies, Program Staff, the public, and with technical and scientific review and input. Assessment is submitted to Program Staff for review and submitted to the Policy Group for approval and incorporation into the Annual Report.
5. Coordination: The Program manager coordinates with, and obtains input from, Program Staff, appropriate agencies, public, local regions, and technical and scientific sources in the design and implementation of the Program Element.

Program Support

Numerous governmental and nongovernmental agencies will be involved in critical aspects of CALFED implementation. This MOU describes the various roles of the State and Federal agencies signing this MOU. Although many CALFED Agencies will have a coordinating role in CALFED implementation, for the purposes of this MOU, only the agencies with a key role in implementation have been listed.

Attachment B

Oversight, Management and Support Responsibilities for Program Elements

1. Levee System Integrity

The CALFED Levee System Integrity Program (Levee Program) in large part adopts an existing program (Delta Subventions and Special Projects) currently managed by DWR with oversight by DFG, Resources Agency, California Water Commission and Reclamation Board. Because of the expertise and existing program authority and structure in place, the CALFED Levee Program will be co-managed by the DWR and the USACE. The Policy Group and Program Staff will provide oversight in coordination with existing oversight agencies.

Oversight and Coordination

- C The Policy Group and Program Staff
- C The California Water Commission will continue to be responsible for Program approval for the Special Projects Program, and Reclamation Board for the levee subvention program, but will consider the recommendations from the Policy Group
- C The Resources Agency and DFG will continue their responsibilities under current law to review and approve DWR levee plans (subventions and special projects). The Resources Agency and DFG will coordinate with the CALFED Levee and Ecosystem Restoration Programs.

Program Management

- C DWR and the USACE will co-manage the CALFED Levee Program. DWR and the USACE will develop a recommendation to the Policy Group by February 1, 2001, in coordination with other interested agencies and stakeholders, that describes how the Levee Program will be co-managed and responsibilities distributed.

Program Support

- C NRCS will coordinate with the Levee Program on NRCS-related programs such as the Emergency Watershed Protection Program which provides emergency financial and technical assistance, and the Floodplain Easement Program.
- C Regulatory Agencies -- USFWS, NMFS, DFG, SWRCB, Central Valley Regional Water Quality Control Board, State Lands Commission.

2. Ecosystem Restoration Program

The governance of the Ecosystem Restoration Program (ERP) has been a focus of discussion for over three years. This Program has received significant attention primarily because of the size and complexity of the Program and the current fragmentation of the restoration Programs among State and Federal agencies. CALFED believes the ERP will be managed most successfully by the Program Staff, with input from appropriate agencies, the public, and scientific and technical sources. The ERP includes the ecosystem water quality actions. The ERP would continue to be under the oversight of the Policy Group.

The five State and Federal agencies that execute the EWA Operating Principles Agreement will have responsibility for implementing the EWA. The EWA management agencies will be USFWS, NMFS, and DFG. The management agencies will exercise their biological judgement to determine what SWP/CVP operational changes are beneficial to the Bay-Delta ecosystem and/or the long-term survival of fish species, including those listed under the State and Federal Endangered Species Acts. The project agencies (Reclamation, and DWR) will cooperate with the management agencies in administering the EWA, including banking, borrowing, and conveyance of EWA assets and making operational changes proposed by the management agencies. The project agencies will also be responsible for acquiring EWA assets for the first year. Policy Group will oversee the EWA.

Oversight and Coordination

- C Policy Group/Program Staff/Executive Director
- C Final Program and Funding Approval -- Numerous State and Federal agencies will participate in funding ERP actions and therefore will have final program authority for those actions (such as Resources Agency, DFG, USFWS, NMFS, Reclamation)

Program Management

- C Program Staff for ERP
- C Fishery Agencies for EWA

Program Support

- C Regulatory Agencies -- USFWS, NMFS, USACE, DFG, SWRCB, Regional Boards, State Lands Commission, Reclamation Board
- C Implementing Agencies -- EPA, BLM, USFWS, USACE, NRCS, DFG, SWRCB, DFA, Department of Parks and Recreation, Department of Conservation, DWR and Reclamation.

3. Watershed Program

The CALFED Watershed Program (Watershed Program) will be managed initially by Program Staff with a final decision on management by February 1, 2001. The Policy Group will provide program oversight and coordination.

Oversight Coordination

- C Policy Group
- C Final Program and Funding Approval -- Numerous State and Federal agencies will participate in funding Watershed actions and therefore will have final program authority for those actions (such as Resources Agency, SWRCB, DFG, DWR, USFS, NRCS, USFWS, EPA)

Program Management

- C Program Staff will initially assume Program Management responsibility for the Watershed Program. SWRCB, Resources Agency and NRCS, with input from other interested agencies and stakeholders, will develop a recommendation in an MOU to Policy Group by February 1, 2001, on the future program management of the Watershed Program. Approval by the Policy Group of the recommendations in the Watershed MOU shall not require modification of this Implementation MOU by the process set forth in Section J.

Program Support

- C Implementing Agencies -- USFS, NRCS, EPA, BLM, SWRCB, Regional Boards, DWR, DFG, DFA, DOC, DPR, CDF.
- C Regulatory Agencies.-- USFWS, NMFS, USACE, DFG, SWRCB, Regional Boards.

4. Water Quality (Drinking Water)

Responsibility for drinking water quality in the Bay-Delta ecosystem is currently shared among several State and Federal agencies. The CALFED Drinking Water Quality Program (DWQ Program) includes a broad array of actions and approaches. Program management for the DWQ Program is assigned initially to Program Staff with a final decision on management by February 1, 2001. Policy Group will provide oversight and coordination.

Oversight and Coordination

- C Policy Group
- C Final Program and Funding Approval -- Several State and Federal agencies will participate in funding Drinking Water Quality actions and therefore will have final program authority for those actions (such as SWRCB, Central Valley RWQCB, DHS, DWR, EPA).

Program Management

- C Program Staff will initially assume Program Management responsibility for the DWQ Program. DHS, SWRCB, and EPA, with input from other interested agencies and stakeholders, will develop a recommendation in an MOU to Policy Group by February 1, 2001 on the future program management of the CALFED DWQ Program. Approval by the Policy Group of the recommendations in the DWQ MOU shall not require modification of this Implementation MOU by the process set forth in Section J.

Program Support

- C Implementing Agencies: SWRCB and Central Valley RWQCB will implement studies and research on source water improvements, develop water quality objectives in revised basin plans to address drinking water contaminants and contaminant precursors. USEPA and DHS will implement treatment and health effects research and studies. DWR and Reclamation will participate in engineering and other aspects of actions related to source water improvement, storage and conveyance. DFA will participate in drainage management and salt utilization.
- C Regulatory Agencies. DHS, SWRCB, Central Valley RWQCB, and EPA.

5. Water Transfers Program

Three agencies (Reclamation, SWRCB, and DWR) have current authority for water transfers in California. The CALFED Water Transfers Program adopts actions that will reduce the barriers to water transfers and increase the access to information on water transfers. The three agencies will assume responsibility for managing and implementing the Water Transfer Program actions, and the Policy Group and Program Staff will provide Program oversight and coordination. To ensure equal oversight of the Water Transfers Information Clearinghouse by the three agencies, the Program Staff will manage the Clearinghouse under the direction and coordination of the three agencies.

Oversight and Coordination

- C Policy Group and Program Staff
- C Final Program and Funding Approval -- DWR, SWRCB, and Reclamation will participate in funding Water Transfer Program actions and therefore will have final program authority for those actions.

Program Management

- C SWRCB, DWR, and Reclamation will co-manage the Water Transfers Program
- C Program Staff will manage the Water Transfer Information Clearinghouse in coordination with and under the direction of the DWR, SWRCB, and Reclamation, as well as the Policy Group.

6. Water Use Efficiency

The CALFED Water Use Efficiency Program (WUE Program) includes water conservation and water recycling components.

- A. Conservation: The Water Conservation component builds upon existing State and Federal Water Conservation programs within DWR, Reclamation, and NRCS, but is broader in scope and adopts new approaches. The Water Conservation component will be co-managed by DWR, Reclamation, and NRCS. Assignment of responsibility for program management is based on agency expertise and program authority. Assigning responsibility for Program Management to existing State and Federal agencies will increase the integration and coordination with existing related programs.
- B. Recycling: The SWRCB and Reclamation will manage the recycling component of the WUE Program because of their expertise and current authority with these programs and to increase integration with existing programs. The Policy Group and Program Staff will provide oversight and coordination.

Oversight and Coordination

- C Policy Group and Program Staff
- C Final Program and Funding Approval -- Several State and Federal agencies will participate in funding WUE and Recycling actions and, therefore will have final Program authority for those actions (such as Reclamation, NRCS, USFWS, SWRCB, and DWR).

Program Management

- C DWR will manage the WUE loan and grant program (excluding CVPIA and NRCS financial assistance) and co-manage technical assistance programs with Reclamation and NRCS.
- C Reclamation will manage the CVPIA WUE financial and technical assistance programs and Federal recycling programs in coordination with SWRCB.
- C NRCS will co-manage the on-farm agricultural WUE technical assistance with DWR.
- C SWRCB will manage State recycling programs in coordination with Reclamation.

Program Support

- C Implementing Agencies -- the USFWS will continue, as part of the CVPIA, to be the lead implementing agency for providing financial and technical assistance for managed wetlands. DFA will continue to cooperate with NRCS, Reclamation, and DWR in supporting the on-farm efficient water management practices and the activities of the Agricultural Water Management Council.

7. Storage

The CALFED Water Storage Program (Storage Program) includes planning, design and possible construction of surface and groundwater storage facilities. DWR and Reclamation are the State and Federal agencies with expertise and program and funding authority in the planning, and construction of water storage facilities. DWR and Reclamation will continue to manage the storage activities. WAPA will support the implementing agencies in evaluating and analyzing power-related storage alternatives. The Policy Group and Program Staff will provide oversight and coordination.

Oversight and Coordination

- C Policy Group and Program Staff
- C Final Program and Funding Approval --The Reclamation and DWR will provide funding and therefore will have final program authority for those actions.

Program Management

- C DWR and Reclamation will co-manage the CALFED Surface and Groundwater Storage Program. Distribution of responsibilities will be determined based on expertise, funding authority, and location of the proposed project in the State or Federal water project service area.

Program Support

- C Regulatory Agencies -- USACE, USEPA, NMFS, USFWS, DFG, State Lands Commission, SWRCB
- C Implementing Agencies -- DWR, Reclamation.

8. Conveyance

The Conveyance Program of the CALFED Program includes actions to improve ecosystem health, water supply reliability, and water quality. DWR and Reclamation will co-manage the Conveyance Program. Project management responsibility will remain with Reclamation, DWR, DFG, and other state, Federal or local entities with expertise in individual projects. The Program Staff and Policy Group will provide oversight and coordination for the Conveyance Program.

Oversight and Coordination

- C Policy Group and Program Staff
- C Final Program and Funding Approval -- Several State and Federal agencies will participate in funding the conveyance actions and, therefore will have final program authority for those actions (such as Reclamation, DWR, DFG).

Program Management

- C DWR and Reclamation will co-manage the Conveyance Program actions. Distribution of program and project management between the two agencies will be based on expertise and relationship to State and Federal water project operations. DWR and Reclamation will report to the Policy Group on the recommended distribution of responsibilities between their two agencies by December 1, 2000.

Program Support

- C Implementing Agencies/ Project Management -- DWR, Reclamation
- C Regulatory Agencies -- SWRCB, USEPA, USACE, USFWS, NMFS, DFG, Reclamation Board, State Lands Commission, Regional Boards

Attachment C - Table 1

Initial List of CALFED Category A ¹ & Category B ² State and Federal Programs *		
Funding Agency / Program Element	Category A Programs (Funding Source)	Category B Programs (Funding Source)
Resources Agency		
Ecosystem Restoration	--CALFED Ecosystem Restoration (Prop 204 \$390 million)	
Department of Water Resources		
Ecosystem Restoration	--CVPIA State Cost Share (Prop 204) --Four Pumps Agreement (State Water Project (SWP))	--Sacramento-San Joaquin Comprehensive Study --Urban Streams and Flood Protection Corridor (Prop 13) --Suisun Marsh Protection (SWP, General Fund (GF))
Water Quality	--Bay-Delta Multi-purpose Water Management (Prop 13 - low dissolved oxygen & abandoned mine drainage)	--Agricultural Drainage Program (SWP, Prop 204)
Water Use Efficiency (WUE)	--Agricultural and Urban WUE technical assistance (GF) --WUE Loans (Prop 13)	
Water Transfers	--Water Transfers Facilitation and Marketing (SWP)	
Levees	--Delta Levee Maintenance Subventions (Prop 13) --Special Flood Control Projects (Prop 13) --Delta Levees Emergency Response (Prop 13)	
Storage	--Integrated Storage Investigations (GF) --Groundwater Storage/Conjunctive Use (Prop 13) --Groundwater Recharge (Prop 13)	--Statewide Planning Program/Bulletin 160 (GF) --Bulletin 118 process/Groundwater Assessment (Prop 13)
Conveyance	--Bay-Delta Multi-purpose Water Management (Prop 13 - In-Delta Ag Drainage, SWP/CVP fish facilities, South Delta Barriers, and Grant Line Canal Barrier) --Delta Facilities Planning (SWP)	
Science Program	--Interagency Ecological Program (SWP)	
¹ Category A -- Programs and funding that should be managed and implemented consistent with the CALFED Program and CALFED objectives		
² Category B -- Related programs and funding that should be managed and implemented in coordination with the CALFED Program		

*This table shall be reviewed and revised as necessary by the Policy Group.

Attachment C - Table 1

Funding Agency / Program Element	Category A Programs (Funding Source)	Category B Programs (Funding Source)
State Water Resources Control Board		
Water Use Efficiency (WUE)	--Water Recycling (Bond Measures--Prop 204, Prop 13, etc) --Water Recycling (Clean Water State Revolving Fund)	
Watershed		--Watershed Protection (Prop 13)
Water Quality		--Nonpoint Source Pollution (Clean Water Act 319h, 205j, 104b3, 106, 604b, Prop 13) --Water Quality Planning (Clean Water Act 205j, 604b) --Total Maximum Daily Load (Clean Water Act 104b3, 106, 319)
Science Program	--Interagency Ecological Program	
Department of Fish and Game		
Ecosystem Restoration	--CVPIA State Cost Share (Prop 204)	--Lands and Natural Areas Program (multiple funds) --Watershed Program/Trinity portions --Restoration Programs (multiple funds)
Science Program	--Interagency Ecological Program	--Salmon and Steelhead Assessment and Monitoring Program (GF)
Wildlife Conservation Board		
Ecosystem Restoration		--Land Acquisition Programs (Wildlife Restoration Fund (WRF), Habitat Conservation Fund (HCF)) --Inland Wetlands Conservation Program (WRF, HCF) --California Riparian Habitat Conservation Program (WRF, HCF)
Department of Parks & Recreation		
Ecosystem Restoration	--Sacramento, San Joaquin, and Cosumnes River Corridors (Prop 12 - \$13 million one time FY 00-01)	--Land Acquisition and Restoration (multiple funds)
Department of Boating and Waterways		
Ecosystem Restoration		--Egeria & Water Hyacinth Management Programs (Harbors and Watercraft Revolving Fund (HWRF))
Department of Health Services		
Water Quality		--Safe Drinking Water State Revolving Fund
Department of Forestry and Fire Protection		
Watershed		--California Forest Improvement Program (CFIP) (State Forest Resources Improvement Fund) --Stewardship Incentive Program (SIP) (Federal Cooperative Forestry Assistance Act of 1978 (FCFAA)) --Forest Stewardship Program (FCFAA)

*This table shall be reviewed and revised as necessary by the Policy Group.

Attachment C - Table 1

Funding Agency / Program Element	Category A Programs (Funding Source)	Category B Programs (Funding Source)
Department of Food and Agriculture		
Ecosystem Restoration		--Integrated Pest Control Branch - Hydrilla Eradication Program (GF, HWRF, Agricultural Fund, Reimbursable Funds)
Water Quality		--On-farm Ag Drainage Management (Prop 204) --Fertilizer Research and Education --Dairy Quality Assurance Program
State Lands Commission		
Ecosystem Restoration		--Land Acquisition and Conservation (Kapiloff Land Bank)
U.S. Bureau of Reclamation		
CALFED Program Implementation	--CALFED Appropriation (includes Bay-Delta Act)	
Ecosystem Restoration	--CVPIA, Anadromous Fish Restoration Program & Anadromous Fish Screen Program (Restoration Fund (RF)) --CVPIA, Water Acquisition (RF, WRR) --CVPIA, Dedicated Project Yield (RF) --CVPIA, Clear Creek Restoration (RF, WRR) --CVPIA, Butte Creek Restoration (WRR) --CVPIA, Spawning Gravel/Riparian Habitat (RF) --Tracy Direct Loss Mitigation Program/Tracy Agreement (WRR)	--Suisun Marsh Protection (Water and Related Resources (WRR))
Water Use Efficiency (WUE)	--CVPIA, Water Conservation (WRR, CVP Operations & Maintenance) --Water Recycling (Title XVI)	
Water Transfers	--Water Transfers Facilitation and Marketing (WRR, CVP, Water Marketing)	
Water Quality		--CVPIA, Land Retirement (RF) --Drainage Management Program (WRR) --CVPIA, San Joaquin Basin Action Plan (WRR)
Storage	--CVP Yield Feasibility, Shasta Enlargement (WRR) --CVPIA, Project Yield Increase (3408(j))	
Conveyance	--CVPIA, Tracy Fish Facilities Improvement Program (RF)	
Science Program	--Interagency Ecological Program (WRR)	--Central Valley Assessment/Monitoring Program (CAMP) (RF)

*This table shall be reviewed and revised as necessary by the Policy Group.

Attachment C - Table 1

Funding Agency / Program Element	Category A Programs (Funding Source)	Category B Programs (Funding Source)
U.S. Army Corps of Engineers		
Ecosystem Restoration	--Prospect Island (Section 1135) --Cosumnes/Mokelumne Study (GI)	--Sacramento-San Joaquin Comprehensive Study (Energy and Water Appropriations Act, General Investigations (GI)) -- Section 1135 Programs for projects in the CALFED Solution Area (Section 1135, WRDA 86) --General Investigations Program (for projects in the CALFED solution area) (GI)
Levees	--Delta Study (GI)	
Science Program	--Interagency Ecological Program	
Natural Resource Conservation Service		
Watershed/Ecosystem		--Wetlands Reserve Program (Federal Agriculture Improvement & Reform Act of 1996 (Farm Bill)) --Environmental Quality Improvement Program (Farm Bill)
Water Use Efficiency (WUE)		--Environmental Quality Incentive Program (Farm Bill)
U.S. Fish & Wildlife Service		
Ecosystem Restoration	--CVPIA, Anadromous Fish Restoration Program & Anadromous Fish Screen Program (RF) --CVPIA, Water Acquisition (RF, WRR) --CVPIA, Clear Creek Restoration (RF, WRR) --CVPIA, Butte Creek Restoration (WRR) --CVPIA, Spawning Gravel/Riparian Habitat (RF)	--Federal Aid in Wildlife Restoration (Pittman-Robertson Act) --Cooperative Endangered Species Conservation Fund --North American Wetlands Conservation Fund --Land Acquisition Program --Partners for Fish & Wildlife Program
Science Program	--Interagency Ecological Program	
U.S. Geological Survey		
Science Program	--Interagency Ecological Program	--Monitoring Programs in the Bay-Delta System
U.S. Environmental Protection Agency		
Ecosystem Restoration		--National Estuary Program (CWA 320)
Water Quality		--Nonpoint Source Pollution (Clean Water Act 319h, 205j, 104b3, 106, 604b) --Water Quality Planning (Clean Water Act 205j, 604b) --Total Maximum Daily Load (Clean Water Act 104b3, 106, 319) --Safe Drinking Water State Revolving Fund --Clean Water State Revolving Fund --Sacramento River Watershed Program
Science Program	--Interagency Ecological Program	

*This table shall be reviewed and revised as necessary by the Policy Group.

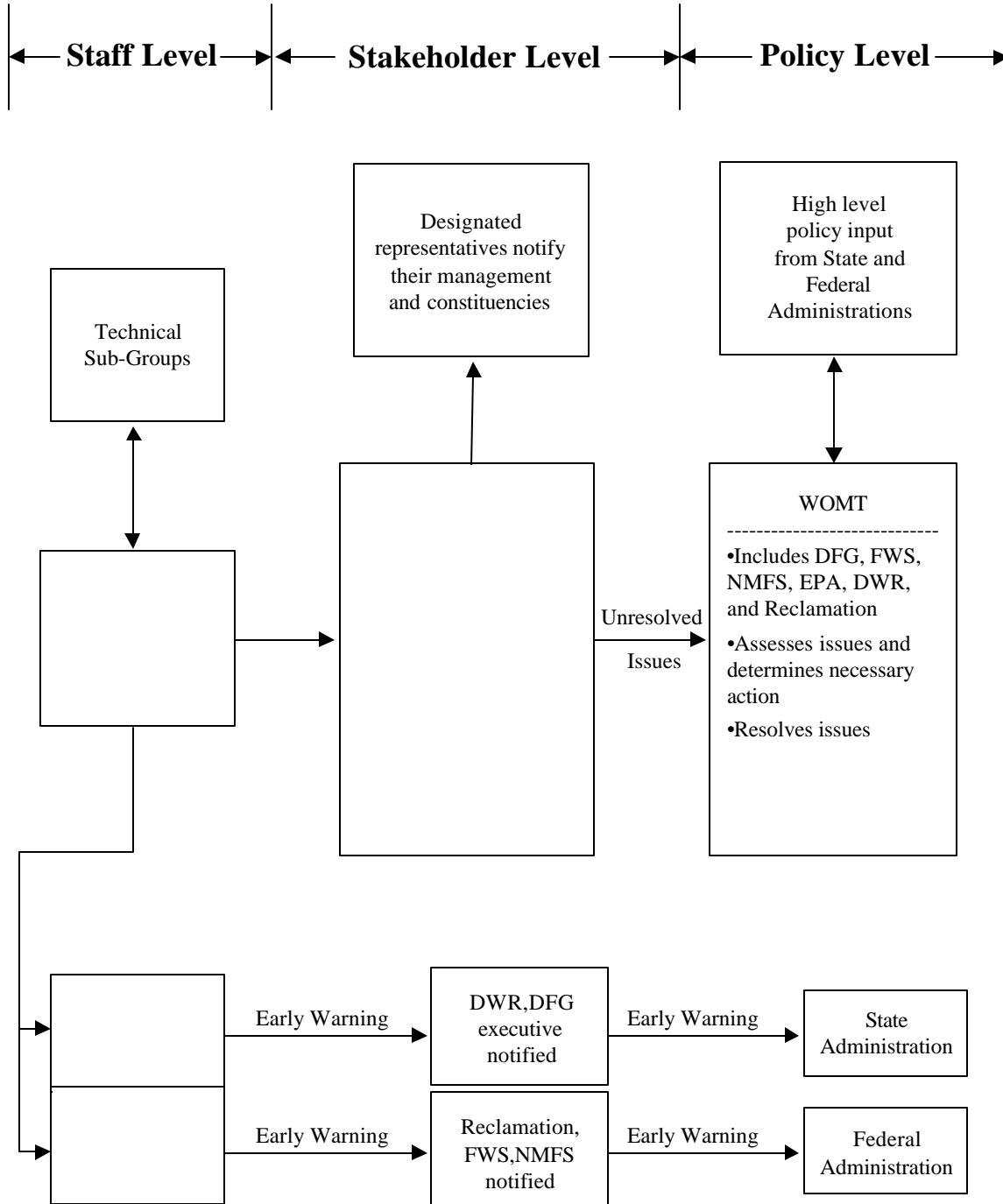
Attachment C - Table 1

Funding Agency / Program Element	Category A Programs (Funding Source)	Category B Programs (Funding Source)
U.S. Forest Service		
Watershed		--Land Stewardship, restoration, and reforestation programs (National Forest System Appropriations, Prescribed Fire and Brush Disposal Trust Funds, Salvage Harvest Funds)
Science Program		--Pacific Southwest Forest & Range Research Program
National Marine Fisheries Service		
Science Program	--Interagency Ecological Program	

*This table shall be reviewed and revised as necessary by the Policy Group.

Attachment D

Operations Decision-Making Process



Attachment E

CALFED Science Program

Functions and Responsibilities: The CALFED Science Program will provide one Comprehensive Monitoring, Assessment and Research program to serve all the CALFED Program Elements. This will be accomplished by building on the foundation of existing agency and stakeholder science programs, including the Interagency Ecological Program (IEP). IEP consists of representatives from USGS, Reclamation, FWS, EPA, NMFS, USACE, SWRCB, DWR, DFG, and stakeholder communities. The Science Program will be neither fully independent, nor fully imbedded in the CALFED Program Elements. Rather, the Science Program will provide a balance of independent review/oversight to ensure credibility. The CALFED Science Program will have a role in performing and/or overseeing the following functions:

1. Planning and Priorities
2. Monitoring
3. Data Management
4. Assessment (e.g. status and trends, project, regional)
5. Research
6. Trial Implementation Actions
7. Reporting
8. Independent Science Review
9. Coordination

Lead Scientist and Program Staff: The Science Program will be directed by a Lead Scientist that reports directly to the CALFED Executive Director. The Science Program will be developed and directed by an Interim Lead Scientist, who will also serve in the role of Lead Scientist in the initial years of Program implementation.

The Lead Scientist will facilitate integration among Program Elements, especially where technical issues and outcomes of actions have implications for more than one Program Element. The Lead Scientist will be supported by a technical staff member who will interface with Program Staff, scientists, other technical experts and agency staff from other related programs, including regulatory staff. Science Program staff will not actually do fieldwork and data collection, but will direct and integrate science and management activities with a focus on the "big picture." Some Science Program Staff will be dedicated to specific CALFED Program Elements and will have joint reporting responsibility to both the Lead Scientist and the respective Program Manager. Each CALFED Program Element will retain science/technical staff, as appropriate, with responsibilities for their particular program and coordination with the CALFED Science Program.

The Lead Scientist has the responsibility to assure that monitoring is conducted to provide information to assess progress toward meeting goals and objectives of the CALFED Program. The Lead Scientist is responsible for establishing an overall monitoring strategy and performance measures for CALFED. System-wide status and trends monitoring and regional monitoring are particular responsibilities of the Lead Scientist with oversight of the monitoring of individual projects conducted by the Program Elements. Coordination of monitoring components among CALFED Program Elements is part of this responsibility.

With regard to research, the Lead Scientist will be responsible for CALFED producing studies that are relevant, authoritative and objective. The studies should progressively reduce uncertainties about critical issues, add to the knowledge that aids water management and ecosystem restoration, and help prepare for future uncertainties. Identifying the state of knowledge will be accomplished by white papers, workshops of experts, or other objective, expert-based analyses. Prioritization of research will begin with the 12 uncertainties specified in the ERP Strategic Plan.

The Lead Scientist has the responsibility for making sure that the findings of the CALFED Science Program are shared with the Policy Group, Program managers, the public, and the scientific community.

Adaptive Management: An overarching principle of the Science Program is adaptive management. Adaptive management is defined as using and treating actions as partnerships between scientists and managers, designing those actions as experiments with a level of risk commensurate with the status of those species involved, and bringing science to bear in evaluating the feasibility of those experiments. New information and scientific interpretations will be developed via adaptive management as the programs progress, and will be used to confirm or modify problem definitions, conceptual models, research, and implementation actions.

Adaptive management will be conducted within the programs, and as such must be carried out within the programs. However, the Lead Scientist will, in collaboration with the programs, develop a general strategy with regard to the scientific aspects of the adaptive management. The strategy will be common among the programs to the extent possible. The Lead Scientist will report annually to the Executive Director and the Policy Group on the implementation by the CALFED Program of science and the scientific aspects of the adaptive management process.

Science Coordination Team: Consistent with FACA, the Science Program will establish a Science Coordination Team chaired by the Lead Scientist to assist in implementing the Science Program. The team will consist of technical experts and scientists from the CALFED Agencies and stakeholder communities implementing and or monitoring major elements of the CALFED Program. Agency/stakeholder technical workgroups will be formed to assist in defining and implementing various aspects of the Science Program. For example, the existing Agency/Stakeholder Ecosystem Team (ASET) will likely continue to provide assistance to implementing the ERP.

Independent Science Review: The Science Program is committed to extensive external peer review and extensive use of expert technical panels to clarify the state of knowledge and recommend scientific directions. The Science Program will include two levels of independent review: a standing Independent Science Board for the entire CALFED Program, and a variety of Science Panels focused on specific programs/issues.

The Independent Science Board will be responsible for advising the Science Program and CALFED Executive Director on key scientific issues as well as providing periodic reviews of the quality and effectiveness of the CALFED Science Program itself.

Program/issue specific Science Panels may be standing bodies or convened on an as needed basis. For example, an independent EWA Science Panel will be convened before the end of 2001. Also, the existing ERP Interim Science Board will likely become the ERP Science Panel and provide ongoing independent review of the ERP.

Mitigation Monitoring: It is the responsibility of the Science Program to review the overall efficacy of mitigation and to identify areas of uncertainty about mitigation approaches or areas that require more monitoring or study.

In order to fulfill this requirement, the lead agencies responsible for environmental review of project-specific actions will assure that appropriate programmatic mitigation, as well as project-specific mitigation measures are adopted, implemented, and monitored periodically, but at least annually. The lead agencies will report on their progress to Program Managers. Program Managers will evaluate and report their assessments to the Lead Scientist.

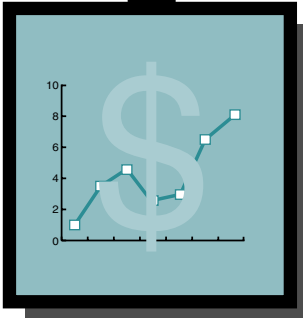
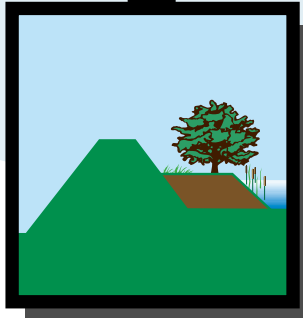
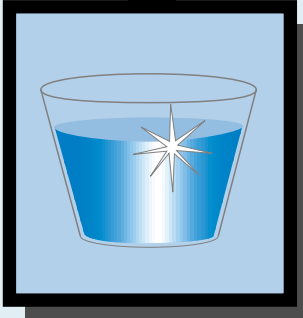
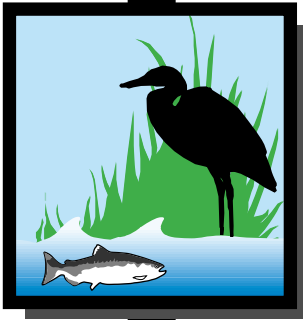
The Lead Scientist will provide a summary of this information to the Executive Director and Policy Group as a portion of the Annual Report described in Section E of this MOU.

Interface with Regulatory Actions: There will be a formal role for the Lead Scientist in advising on regulatory issues which entails:

- C review and clarify the state of knowledge
- C identify critical areas of study that could narrow uncertainties and ensure that such studies are on going
- C oversee and coordinate regional monitoring
- C advise programs about the composition of advisory committees
- C coordinate broad reviews and assessments of the detectable environmental responses to regulatory decisions and management actions and use that information to feedback into the plans for future actions and evaluations of those actions

The Lead Scientist will identify, through consultation with stakeholders and technical experts, controversial issues that have arisen in previous regulatory activities and set up a process to address, clarify and make progress toward resolving those issues.

The role of the Science Program will be one of guidance, review, and overall performance assessments. Independence from day-to-day activities is needed to assure the credibility of reviews and studies designed to reduce uncertainties and facilitate better management. The Lead Scientist (and Science Program) will not be directly involved in making regulatory decisions, but rather in ensuring that CALFED and the CALFED agencies are incorporating the best available knowledge into activities and decisions that are made, as well as continuously working toward narrowing uncertainties, improving that knowledge and advancing the debate. The Science Program will not be involved in day-to-day management decisions regarding water operations and the EWA.



CALFED
BAY-DELTA
PROGRAM

Attachment 4

Clean Water Act Section 404

Memorandum of Understanding

August 28, 2000

**MEMORANDUM OF UNDERSTANDING
ON CLEAN WATER ACT SECTION 404(b)(1)
FOR THE CALFED BAY-DELTA PROGRAM**

RECITALS

These recitals provide background and context for the Memorandum of Understanding that follows.

A. In 1994, the Governor's Water Policy Council of the State of California and the Federal Ecosystem Directorate entered into a Framework Agreement to establish a comprehensive program for coordination and communication with respect to environmental protection and water supply dependability in the Bay-Delta Estuary. This Framework Agreement served as the basis for the CALFED Bay-Delta Program.

B. The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Bay-Delta Program is also guided by solution principles adopted by CALFED agencies. According to the solution principles, a successful Bay-Delta solution must reduce conflicts in the system, be equitable, be affordable, be durable, be implementable, and have no significant redirected impacts.

C. To achieve its purposes, the CALFED Bay-Delta Program has developed eight broad programs as elements of the CALFED preferred program alternative. These program elements are:

1. Ecosystem Restoration Program
2. Levee System Integrity Program
3. Storage Program
4. Conveyance Program
5. Water Use Efficiency Program
6. Water Quality Program
7. Water Transfers Program
8. Watershed Program

D. The CALFED Bay-Delta Program seeks to initiate implementation of its preferred alternative after execution of a Record of Decision and Certification pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). The 30-year implementation period following the Record of Decision and Certification is referred to as Phase III of the Program. The CALFED Bay-Delta Program has defined the first seven years after execution of a Record of Decision and Certification as Stage 1 of Phase III.

E. The CALFED Program elements will include actions that involve discharges of dredged or fill material, as defined by regulations promulgated under the Clean Water Act.

F. The Clean Water Act (Act) establishes a goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. Under Section 404(a) of the Act, the United States Army Corps of Engineers (USACE) issues permits for the discharge of dredged or fill material into waters of the United States, in compliance with Guidelines developed by the United States Environmental Protection Agency (EPA) under Section 404(b)(1) of the Act (Guidelines). These Guidelines impose a high standard of protection, requiring that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, which would achieve the project purpose, so long as the alternative does not have other significant adverse environmental consequences. In addition, the Guidelines prohibit any discharge of dredged or fill material that would cause or contribute to a violation of State water quality standards, jeopardize the continued existence of a threatened or endangered species, violate toxic effluent standards, violate marine sanctuary requirements, or cause or contribute to significant degradation of waters of the United States. Moreover, the Guidelines require that unavoidable impacts be offset through appropriate and practicable mitigation. Before issuing a permit the USACE must also determine that the project is not contrary to the public interest.

G. USACE permits are not required for the selection of the preferred program alternative, but will be required prior to implementing individual components of the preferred alternative. Before issuing a permit, the USACE must document, in compliance with the Guidelines requirements:

1. that no practicable alternative to the proposed discharge exists that would have less adverse impacts on the aquatic ecosystem; and
2. when the proposed activity is not water-dependent, a less-damaging practicable alternative is presumed to exist onsite or offsite. The practicability of an alternative is a function of cost, technical and logistical factors in light of overall project purposes. The applicant bears the burden of demonstrating that no practicable alternative exists that will meet the project purpose.

H. Planning efforts and feasibility studies may take many years to complete. Nothing in this Understanding is intended to prevent these studies from proceeding.

I. DEFINITIONS

Decision Documents are the Record of Decision and Certification of the Final Programmatic Environmental Impact Statement and Environmental Impact Report for the CALFED Bay-Delta Program.

Guidelines are the guidelines promulgated by EPA under Clean Water Act Section 404(b)(1) and published at 40 CFR Section 230.

PEIS/EIR is the final Programmatic Environmental Impact Statement and Environmental Impact Report prepared by the CALFED agencies for the CALFED Bay-Delta Program.

Phase II is the period of time during which the CALFED agencies developed a preferred program alternative, conducted comprehensive environmental review, and developed a plan for implementing the preferred alternative. Phase II concludes with the filing of a Record of Decision and Certification of the Final Programmatic EIS/EIR.

Phase III refers to the period of time following the Record of Decision and Certification through the 30-year planning horizon used in developing the CALFED plan. Phase III will include site-specific environmental review and permitting.

Signatories are CALFED agencies that have executed this Understanding. Signatories include the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, the U.S. Environmental Protection Agency, and the California Department of Water Resources.

Stage 1 Actions are those CALFED Actions that have been designated by the CALFED agencies to begin implementation during the seven-year period immediately following execution of the Record of Decision and Certification of the Final Programmatic Environmental Impact Statement and Environmental Impact Report for the CALFED Bay-Delta Program.

II. UNDERSTANDING

A. The Signatories recognize the integrated nature of the CALFED Program and will evaluate individual actions in the context of the overall Program.

B. The Signatories recognize that this Understanding makes no conclusions about the nature of, or extent of, mitigation requirements for unavoidable site-specific adverse impacts to resources identified in site-specific evaluations.

C. The Signatories agree that the program purpose, incorporated by reference as Appendix A, is an acceptable statement of the purpose and need for the CALFED Program.

D. The Signatories, as co-lead CALFED agencies, worked to ensure that the purpose and need statement and the alternatives screening analysis developed during Phase II of the Program and contained in the PEIS/EIR meet the requirements of the Guidelines for discharge activities proposed in Phase III. The Signatories have reviewed the programs and commitments contained in the Decision Documents. Although no USACE permit is required in Phase II, the alternatives analysis for the PEIS/EIR generally follows the requirements of the Guidelines.

E. The Signatories intend to rely on the information developed at the programmatic level, will not require additional review of programmatic alternatives beyond the scope of the programs and commitments described in the Decision Documents, and will focus on project-level alternatives that are consistent with the Decision Documents in selecting the least environmentally damaging practicable alternative at the time of the permit decision unless new information is submitted at the time of the

Section 404 permit process indicating that the programmatic level information is incorrect or incomplete in some material manner. USACE is responsible for assessing whether new information or circumstances warrant additional review of programmatic alternatives and program commitments, after consultation with the relevant agencies and interested stakeholders.

III. ADDITIONAL PROVISIONS

- A. Applicability of this Understanding.** This Understanding was developed in response to a unique circumstance, namely the CALFED Bay-Delta Program, and does not have broader applicability beyond the CALFED Program.
- B. Limitations on this Understanding.** This Understanding does not provide a determination of compliance for individual CALFED activities involving the discharge of dredged or fill material into waters of the United States.
- C. Reservation of Authorities.** This Understanding does not modify existing agency authorities by reducing, expanding or transferring any of the statutory or regulatory authorities and responsibilities of any of the Signatories.
- D. Reservation of Agency Position.** No Signatory to this Understanding waives any administrative claims, positions, or interpretations it may have with respect to the applicability or enforceability of any law or regulation.
- E. Obligation of Funds, Commitment of Resources.** Nothing in this Understanding shall be construed as obligating any of the Signatories to the expenditure of funds in excess of appropriations authorized by law or otherwise commit any of the Signatories to actions for which it lacks statutory authority.
- F. Nature of Understanding.** This Understanding is not intended to, and does not, create any other right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, the State of California, any agencies thereof, any officers or employees thereof, or any other person.
- G. Relationship to Decision Documents.** This Understanding applies only to the programs and related commitments of the CALFED Bay-Delta Program as described in the Decision Documents. This Understanding is conditioned on the programs and related commitments of the CALFED Bay-Delta Program, including those related to water use efficiency, water transfers, and the Ecosystem Restoration Program, being implemented in the same manner as described in the Decision Documents.

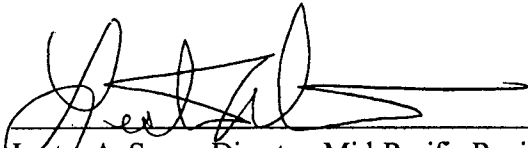
ATTACHMENT

Appendix A. CALFED Bay-Delta Program Purpose Statement.

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt this Clean Water Act, Section 404 Memorandum of Understanding. By signing this document together, we exercise our respective authorities over only those portions relevant to our authority.

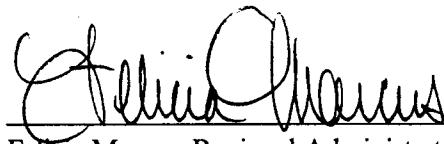
Signed and dated:

United States of America



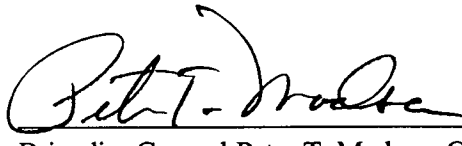
Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation

8/28/00
Date



Felicia Marcus, Regional Administrator
U.S. Environmental Protection Agency


8/28/00
Date



Brigadier General Peter T. Madsen, Commander
South Pacific Division
U.S. Army Corps of Engineers

28 Aug 00
Date

State of California



Thomas M. Hannigan, Director
California Department of Water Resources

8/28/2000
Date

Appendix A. CALFED Bay-Delta Program Purpose Statement

The purpose of the Program is to develop and implement a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. To practicably achieve this program purpose, CALFED will concurrently and comprehensively address problems of the Bay-Delta system within each of four resource categories: ecosystem quality, water quality, water supply reliability, and levee system integrity. Important physical, ecological, and socioeconomic linkages exist between the problems and possible solutions in each of these categories. Accordingly, a solution to problems in one resource category cannot be pursued without addressing problems in the other resource categories.

Because of the complexity of the problems and solutions being considered, the following goals and objectives are described to explain how the Program intends to achieve the purpose within each of these four critical resource categories.

Ecosystem Quality. The goal for ecosystem quality is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. This can be accomplished by addressing the objectives, which collectively improve and increase aquatic and wetland habitats so that they can support the sustainable production and survival of estuarine and anadromous fish and wildlife species, and increase population health and population size to levels that assure sustained survival. The objectives in summary form are:

1. Increase the amount of shallow riverine, shaded riverine, tidal slough, and estuary entrapment and null zone habitats for aquatic species.
2. Improve the in-Delta, upstream, and downstream movement of larval, juvenile, and adult life stages of aquatic species.
3. Reduce water quality degradation.
4. Increase the amount of brackish tidal marsh, fresh-water marsh, riparian woodland, waterfowl breeding habitat, wintering range for wildlife, managed permanent pasture and floodplains, and associated riparian habitats for wildlife species.
5. Contribute to the recovery of threatened or endangered species and species of special concern.

Water Supply Reliability. The goal for water supply reliability is to reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system. This can be accomplished by addressing the objectives, which collectively reduce the conflict among beneficial water users, improve the ability to transport water through the Bay-Delta system, and reduce the uncertainty of supplies from the Bay-Delta system. These objectives in summary form are:

1. Maintain an adequate water supply to meet expected in-Delta beneficial use needs.
2. Improve export water supplies to help meet beneficial use needs.
3. Improve the adequacy of Bay-Delta water to meet Delta outflow needs.
4. Reduce the vulnerability of Bay-Delta levees.
5. Improve the predictability of the water supply available from the Bay-Delta system for beneficial use needs.

Water Quality. The goal for water quality in the Bay-Delta system is to provide good-quality water for all beneficial uses, including drinking water, agricultural uses (both in-Delta and exported), industrial uses, recreational in-Delta uses, and Delta aquatic habitats. This can be accomplished by addressing the objectives, which collectively provide for the improvement of water quality for all beneficial uses. The objectives in summary form are:

1. Improve the reliability and quality of raw water for drinking water needs.
2. Reduce constituents in agricultural water that affect operations and crop productivity.
3. Improve the reliability and quality of water for industrial needs.
4. Improve the quality of raw water for recreational uses including consumption of aquatic resources.
5. Improve the quality of water for environmental needs.

Levee System Integrity. The goal for levee system integrity is to reduce the risk to land uses and associated agricultural and other economic activities, water supply, infrastructure, and the Bay- Delta ecosystem from catastrophic breaching of Delta levees. This can be accomplished by addressing the objectives, which collectively provide management of the risk resulting from gradual deterioration of Delta conveyance and catastrophic breaching of the Delta levees. The objectives in summary form are:

1. Reduce the risk to land use from seepage and overtopping of the levees, subsidence of peat soils, and catastrophic inundation of Delta islands.
2. Reduce the risk to in-Delta and export water supply from sudden catastrophic island inundation and the resultant salinity intrusion.
3. Reduce the risk to in-Delta and export water supply facilities from sudden catastrophic island inundation.
4. Reduce the risk to the existing Delta ecosystem from seepage, erosion, and overtopping of levees; from peat soils; and from catastrophic island inundation and the resultant salinity intrusion.

The purpose statement responds to the following needs.

Ecosystem Quality. The health of the Bay-Delta system has declined as a result of a number of factors, including degradation and the loss of habitats that support various life stages of aquatic and terrestrial biota. Further, the decline in health has resulted from activities within and upstream of the Bay-Delta system. One early human-induced event was hydraulic mining in the river drainages along the eastern edge of the Central Valley. The mining degraded habitat in Central Valley streams as channel beds and shallow areas filled with sediment. In addition, the reduced capacity of the sediment-filled channels increased the frequency and extent of periodic flooding, accelerating the need for flood control measures to protect adjacent agricultural, industrial, and urban lands. Levees constructed to protect these lands eliminated fish access to shallow overflow areas, and dredging to construct levees eliminated the tule bed habitat along the river channels.

Since the 1850s, 700,000 acres of overflow and seasonally inundated lands in the Bay-Delta system have been converted to agricultural, industrial, and urban uses. Many of the remaining stream sections have been dredged or channelized to improve navigation and to increase stream conveyance capacity in order to accommodate flood flows and facilitate water export.

Upstream water development and use, depletion of natural flows by local diverters, and the export of water from the Bay-Delta system have changed seasonal patterns of the inflow, reduced the outflow, and diminished the natural variability of flows into and through the Bay-Delta system. Facilities constructed to support water diversions (upstream, in-Delta, and export facilities) cause straying or direct losses of fish (for example, through unscreened diversions) and can increase exposure of juvenile fish to predation. Entrainment and removal of substantial quantities of food-web organisms, eggs, larvae, and young fish further exacerbate the impacts of overall habitat decline.

Habitat alteration and water diversions are not the only factors that have affected ecosystem health. Water quality degradation caused by pollutants and increased concentrations of substances also may have contributed to the overall decline in the health and productivity of the Bay-Delta system. In addition, undesirable introduced species may compete for available space and food supplies, sometimes to the detriment of native species or economically important introduced species.

Water Supply Reliability. The Bay-Delta system provides the water supply for a wide range of in-stream, riparian, and other beneficial uses—such as drinking water for millions of Californians and irrigation water for agricultural land. While some beneficial water uses depend on the Bay-Delta system for only a portion of their water needs, others are highly or totally dependent on Bay-Delta water supplies. As water use and competition among uses has increased during the past several decades, conflicts have increased among users of Bay-Delta water. Heightened competition for the water during certain seasons or during water-short years has magnified the conflicts.

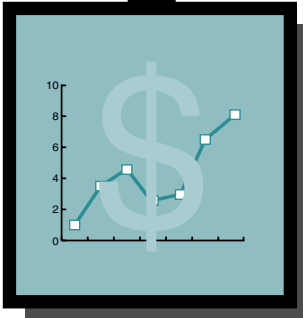
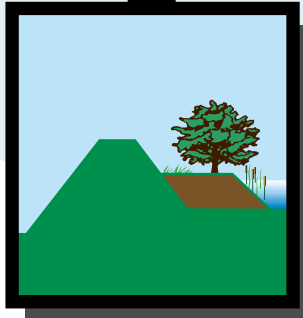
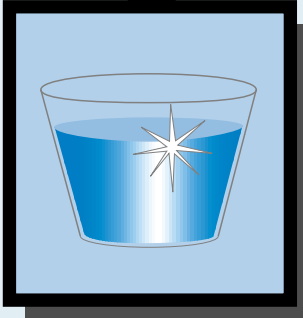
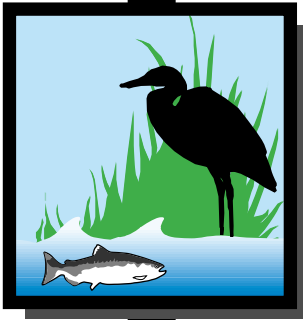
Water flow and timing requirements have been established for certain fish and wildlife species with critical life stages that depend on fresh-water flows. These requirements have reduced water supplies and flexibility to meet the quantity and timing of water delivered from the Bay-Delta system. Water suppliers and users are concerned that additional restrictions that may be needed to protect species

would increase the uncertainty and further reduce the availability of Bay-Delta system water for agricultural, industrial, and urban purposes.

Delta levees and channels may fail. Water users are concerned that such failures could result in an interruption of water supply for both urban and agricultural purposes, and degradation of water quality and aquatic habitats.

Water Quality. Good-quality water is required to sustain the high-quality habitat needed in the Bay-Delta system to support a diversity of fish and wildlife populations. In addition, the Bay-Delta system is a source of drinking water for millions of Californians and is critical to the state's agricultural sector. The potential for increasingly stringent drinking water requirements that require new treatment technologies is spurring water providers to seek higher quality source waters and to address pollution in source waters. Pollutants enter the Bay-Delta system through a variety of sources, including sewage treatment plants, industrial facilities, forests, farm fields, mines, residential landscaping, urban streets, ships, and natural sources. The pollutants, pathogens, natural organics, and salts in the Bay-Delta system affect, in varying degrees, existing fish and wildlife, as well as human and agricultural uses of these waters. The salts entering the Bay-Delta system from the ocean and from return flows upstream and within the Delta decrease the utility of Bay-Delta system waters for many purposes, including the ecosystem, agriculture, and drinking water. The level of natural organics in the water (resulting primarily from the natural process of plant decay on many of the Delta peat soil islands) is of concern because of by-products formed from natural organics reacting with disinfection chemicals commonly used to meet public health requirements in water treatment.

Levee System Integrity. Levees were first constructed in the Delta during the late 1800s, when settlers began to turn tidal marshes into agricultural land. Over time, both natural settling of the levees and shallow subsidence (oxidation, which lowers the level of the land over time) of the Delta island soils resulted in a need to increase levee heights to maintain protection. There is a growing concern that this increased height, coupled with poor levee construction and inadequate maintenance, make Delta levees vulnerable to failure, especially during earthquakes or floods. Failure of Delta levees can result in flooding of Delta farmland and wildlife habitat. If a flooded island is not repaired and drained, the resulting large body of open water can expose adjacent islands to increased wave action and possible levee erosion. Levee failure on specific islands can affect water supply distribution systems, such as the Mokelumne Aqueduct. Similarly, levee failure on key Delta islands can draw salty water up into the Delta, as water from downstream rushes to fill the breached island. This is of particular concern in low-water years when less fresh water is available to repel the incoming salt water. Such a failure could interrupt the water supply for urban, agricultural, and environmental uses, and degrade water quality and aquatic habitats.



CALFED
BAY-DELTA
PROGRAM

Attachment 5 Conservation Agreement Regarding Multi-Species Conservation Strategy

August 28, 2000

Conservation Agreement

by and among

**the United States Fish and Wildlife Service,
the National Marine Fisheries Service,
the United States Bureau of Reclamation,
the United States Bureau of Land Management,
the United States Environmental Protection Agency,
the United States Army Corps of Engineers,
the Natural Resources Conservation Service,
the California Resources Agency,
the California Department of Fish and Game, and
the California Department of Water Resources**

regarding the

**CALFED Bay-Delta Program
Multi-Species Conservation Strategy**

August 28, 2000

CALFED Bay-Delta Program Multi-Species Conservation Strategy Conservation Agreement

This agreement regarding the **CALFED Bay-Delta Program Multi-Species Conservation Strategy** (“Agreement”) is entered into as of the Effective Date by and among the **United States Fish and Wildlife Service** (“USFWS”), the **United States Bureau of Reclamation** (“USBR”), the **United States Bureau of Land Management** (“BLM”), the **National Marine Fisheries Service** (“NMFS”), the **United States Environmental Protection Agency** (“EPA”), the **United States Army Corps of Engineers** (“USACE”), the **Natural Resource Conservation Service** (“NRCS”), the **California Resources Agency** (“Resources Agency”), the **California Department of Fish and Game** (“DFG”) and the **California Department of Water Resources** (“DWR”). These entities may be referred to collectively as “Parties” and each individually as a “Party.” USFWS, NMFS and DFG are referred to herein collectively as “the Fishery Agencies.” USBR and DWR are referred to herein collectively as “the Water Agencies.”

Recitals

A. In 1994, the Governor’s Water Policy Council of the State of California and the Federal Ecosystem Directorate entered into a Framework Agreement to establish a comprehensive program for coordination and communication with respect to environmental protection and water supply dependability in the San Francisco Bay/San Joaquin River Bay-Delta Estuary. This Framework Agreement served as the basis for the **CALFED Bay-Delta Program** (“Program”).

B. The Program is a cooperative effort of eighteen State and federal agencies with regulatory and management responsibilities in the Bay-Delta to develop a long-term plan to restore ecosystem health and improve water management for beneficial uses of the Bay-Delta system. The Program’s objective is to identify comprehensive solutions to the problems of ecosystem quality, water supply reliability, water quality, and Delta levee and channel integrity.

C. The Program’s mission is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The Program is also guided by solution principles adopted by CALFED agencies. According to these principles, a successful Program solution must reduce conflicts in the system, be equitable, be affordable, be durable, be implementable, and have no significant redirected impacts.

D. On or near the Effective Date, the Resources Agency, USBR, USFWS, NMFS, EPA, NRCS, and the USACE will issue a **Record of Decision** (“ROD”) and will certify the **Final Programmatic Environmental Impact Statement/Environmental Impact Report** (“EIS/EIR”) prepared for the Program pursuant to the **National Environmental Policy Act** (“NEPA”) and the **California Environmental Quality Act** (“CEQA”). Following issuance of the ROD, specific Program actions will be developed and implemented in accordance with applicable environmental laws.

E. Certain Program actions may result in adverse effects upon species of fish, wildlife and plants and their habitat. Among these species are species that are protected under the **California Endangered Species Act** (“CESA”), the **federal Endangered Species Act** (“FESA”), or both CESA and FESA.

F. The **CALFED Bay-Delta Program Multi-Species Conservation Strategy** dated July 2000 (“MSCS”) was developed for the Program in accordance with FESA, CESA and California’s **Natural Community Conservation Planning Act** (“NCCPA”). The MSCS is a comprehensive programmatic strategy for the conservation of numerous species of fish, wildlife and plants and their habitat based on key Program elements, such as the Program’s Ecosystem Restoration Program and the Environmental Water Account. Implementation of the MSCS is intended to ensure that entities implementing Program actions will satisfy the requirements of FESA, CESA and the NCCPA. A primary purpose of this agreement is to allow the MSCS to serve as adequate compliance under NCCPA.

G. The USFWS’ “Programmatic Biological Opinion on the CALFED Bay-Delta Program,” dated August 28, 2000, NMFS’ “CALFED Bay-Delta Program Programmatic Biological Opinion,” dated August 28, 2000, and DFG’s “Natural Community Conservation Planning Act Approval of the CALFED Bay-Delta Program Multiple Species Conservation Strategy,” dated August 28, 2000, are each based, in part, on the MSCS.

H. To ensure that the MSCS is effective, and to ensure compliance with FESA, CESA and the NCCPA, the Program must be implemented substantially as described in the EIS/EIR, and the MSCS and Biological Opinions must be implemented and adhered to. FESA compliance shall be conducted in a manner consistent with applicable law and regulation.

I. The Parties anticipate that the State Water Resources Control Board (“SWRCB”) will be executing this Agreement in the near future. The Parties recognize that the SWRCB has adjudicative responsibilities with respect to contested regulatory matters that are brought before it. The SWRCB’s responsibilities include the requirement that the SWRCB and its members avoid bias, prejudice, or interest in the adjudicative matters before it; e.g., it cannot decide, before completion of any required hearing or equivalent proceeding, the outcome of a matter. This Agreement does not in any way require or commit the SWRCB to participate in proposing a project that will come before it for approval; nor does this Agreement require or imply that the SWRCB will approve a project that requires an adjudicative proceeding. Under this Agreement, the role of the SWRCB in connection with matters that may require an adjudicative decision is limited to promptly and diligently processing any applications, petitions, or other requests for approval. Nothing in this Agreement commits the SWRCB to an approval or disapproval of any project subject to the SWRCB’s authority, nor to a term or condition in any approval of a project by the SWRCB.

AGREEMENT

To ensure that the MSCS is implemented in a manner consistent with the statutory authority of each Party and the Program objectives, the Parties agree as follows:

I. Definitions

The following definitions shall be used to interpret this Agreement. Terms not defined below, but defined in the MSCS, shall have the definition ascribed in the MSCS.

- A. Action-Specific Implementation Plans are plans developed for specific Program actions that provide information and analyses necessary for compliance with FESA, CESA and the NCCPA, as further described in Chapter 6.1 of the MSCS.
- B. Biological Opinions are the USFWS' "Programmatic Biological Opinion on the CALFED Bay-Delta Program," dated August 28, 2000, NMFS' "CALFED Bay-Delta Program Programmatic Biological Opinion," dated August 28, 2000, and DFG's "Natural Community Conservation Planning Act Approval of the CALFED Bay-Delta Program Multiple Species Conservation Strategy," dated August 28, 2000, or their successor documents.
- C. Covered Species are species for which the MSCS provides program-level compliance for the Program under FESA, the NCCPA, or both. Each Fishery Agency shall maintain a list of Covered Species in accordance with its statutory authority.
- D. Evaluated Species are all of the species of fish, wildlife and plants evaluated and addressed in the MSCS, many of which are Covered Species.
- E. EWA Agreement is the Environmental Water Account Operating Principles Agreement dated August 28, 2000.
- F. MSCS is the "CALFED Bay-Delta Program Multi-Species Conservation Strategy," dated July 2000, a Technical Appendix to the EIS/EIR. The MSCS is hereby incorporated by reference in this Agreement.
- G. MSCS Focus Area means the legal Delta as defined in California Water Code Section 12220, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries downstream of major dams, and the potential locations of conveyance and water storage facilities.
- H. Phase III refers to the period of time following the ROD and Certification encompassing the thirty-year planning horizon used in developing the CALFED plan, during which the Program actions will be implemented. Phase III will include site-specific environmental review and permitting.
- I. Program actions are actions that are within the scope of the Final PEIS/EIR and carried out or funded by CALFED Agencies as part of the Program.

- J. Program Agencies means the Resources Agency, DFG, DWR, the Delta Protection Commission, the Reclamation Board, the California Department of Food and Agriculture, the California Environmental Protection Agency, SWRCB, the Interior Department, USBR, the USFWS, the United States Geological Survey, BLM, EPA, USACE, United States Department of Commerce, NMFS, the United States Department of Agriculture, NRCS, the United States Forest Service, and the Western Area Power Administration. Program Agencies are agencies that are eligible to enter this Agreement.
- K. Regulatory Baseline is the regulatory baseline described in Section 2.2.7 of the ROD.

II. Purpose

The purpose of this Agreement is to define and memorialize the Parties' commitments with respect to the MSCS and the process by which the Parties will comply with FESA, CESA and the NCCPA in the implementation of the Program.

III. Cooperation

The Parties agree to cooperate in the implementation of the MSCS.

IV. Implementation of Program Actions

Each Party that approves, funds or implements a Program action agrees to ensure that the action follows and adheres to the MSCS, is consistent with the Biological Opinions, and is consistent with all applicable legal requirements.

A. MSCS Action-Specific Implementation Plans

The MSCS provides a program-level evaluation of the Program under FESA and the NCCPA, just as the EIS/EIR provides a program-level evaluation of the Program under NEPA and CEQA. The MSCS also requires the preparation of Action-Specific Implementation Plans ("ASIPs") for individual Program actions that may affect a Covered Species. ASIPs are intended to complement the project-level environmental review of individual Program actions under NEPA and CEQA that is anticipated in the EIS/EIR. Each ASIP is intended to fulfill the informational and substantive requirements of FESA, CESA and the NCCPA for each Program action. The use of ASIPs is integral to the MSCS and fundamental to compliance with the Biological Opinions. Each Party that approves, funds or implements a Program action that may affect a Covered Species therefore agrees to ensure that an ASIP is prepared for the action in accordance with Section 6.1 of the MSCS. An ASIP shall not be required for a Program action if the Party that approves, funds or implements the action determines, with the written concurrence of the applicable Fishery Agency(ies), that the action is not likely to adversely modify critical habitat designated pursuant to FESA or adversely affect a Covered Species.

B. Incidental Take

The MSCS does not grant take authority to any Party for any Program action. However, the MSCS creates a simplified FESA and NCCPA compliance process based on the use of ASIPs. Under the MSCS, each Party will use a single ASIP to provide the information and analyses required to comply both with FESA and the NCCPA. An ASIP can then serve both as a biological assessment under Section 7 of FESA and as a **Natural Community Conservation Plan** (“NCCP”) under the NCCPA. Under FESA, ASIPs will streamline consultations with the USFWS and NMFS regarding Program actions. The streamlined consultations are intended to result in the issuance of FESA incidental take coverage for Covered Species in accordance with Section 7 of FESA, where take may occur. Under the NCCPA, ASIPs will be components of the MSCS, which is a programmatic NCCP. As components of the MSCS, each ASIP will fulfill the requirements for an NCCP and may be used to obtain incidental take authorizations for Covered Species for Program actions under CESA. The Fishery Agencies agree to coordinate their review of ASIPs for Program actions and to follow the simplified FESA and NCCPA compliance process described in Section 6.1 and Section 6.2 of the MSCS.

V. Cooperating Landowner Commitments

Many Program actions are expected to enhance or restore the habitat of endangered species and threatened species and to increase populations of such species. Many landowners may be concerned that FESA or CESA may restrict the use of land or water in the area where such Program actions are implemented. To address this concern, and to preserve compatible land uses, the MSCS provides a framework for making commitments to landowners who cooperate in the implementation of Program actions.

VI. The Environmental Water Account

The **Environmental Water Account** (“EWA”) is integral to the Program’s Water Management Strategy and is critical to the success of the Program. The terms and conditions under which the EWA will be established are set forth in the “Environmental Water Account Operating Principles Agreement” dated August 28, 2000, and attached hereto as Exhibit 1 (the “EWA Agreement”). The Water Agencies and the Fishery Agencies agree to implement the EWA in accordance with the EWA Agreement. The other Parties agree to cooperate in the implementation of the EWA.

VII. The Ecosystem Restoration Program

The Program’s objectives for ecosystem restoration are to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta Estuary and its watershed to support sustainable populations of diverse plant and animal species. The **Ecosystem Restoration Program** (“ERP”) is the principal Program element designed to meet these objectives. Implementation of the ERP will be coordinated with by the **Science Program**, which will conduct pertinent research, and monitor and evaluate the implementation of ERP actions. The ERP and the Science Program are directly relevant and important for FESA, CESA and NCCPA compliance and are integral to the MSCS. To ensure that the ERP is implemented in a manner and

to an extent sufficient to sustain programmatic FESA, CESA and NCCPA compliance for all Program elements, the Fishery Agencies have collaborated to develop a single, joint list of MSCS-ERP Milestones (“Milestones”) for Stage 1 of Program implementation. Each Fishery Agency included the Milestones in its Biological Opinions. The Milestones include ecosystem related water quality actions and may include specific Science Program actions. The Fishery Agencies agree that the identified Milestones, if achieved as specified in the Agencies’ Biological Opinions, will define an adequate manner and level of ERP implementation for each stage of Program implementation. The Parties agree to seek funding for and to implement the ERP so as to ensure that the Milestones are achieved. To be successfully implemented, the ERP must be funded in the amount of at least \$150 million annually through Stage 1.

VIII. Regulatory Commitments

A. Program-level Regulatory Commitments

The Parties agree that the following regulatory commitments are being made as a part of the Program:

1. Federal Program-level Regulatory Commitments

There will be no reductions in Central Valley Project (“CVP”) and State Water Project (“SWP”) Delta exports beyond those required under the Regulatory Baseline resulting from measures to protect fish required under FESA, provided that the conditions in Section VIII-B are met.

(a) Fishery Protection Assets

(1) Tier 1

Tier 1 measures are measures comprised by the Regulatory Baseline.

(2) Tier 2

Tier 2 measures are measures comprised by the EWA as described in the EWA Agreement, and the ERP.

(3) Tier 3

Tier 3 measures are additional water assets for fishery resources provided by the Parties without uncompensated reductions in water deliveries to CVP or SWP water users, as described in the EWA Agreement. Tier 3 measures may include water acquisitions from willing sellers or the consensual borrowing of water.

(b) Use of Tiered Fishery Protection Measures

To protect fishery resources under FESA, measures within Tier 1 and Tier 2 will be used first. Tier 3 measures will be used only when Tier 1 and Tier 2 measures are insufficient to avoid jeopardy, as determined by the USFWS or NMFS. Before Tier 3 measures are used, the USFWS and NMFS will consider the views of an independent science panel.

(c) Jeopardy

If, notwithstanding the use of all three tiers of fishery protection assets, the USFWS or NMFS conclude that the Program is likely to jeopardize the continued existence of a species listed as endangered or threatened under FESA, programmatic consultation regarding the Program will be re-initiated. In issuing its opinion on reinitiation, the Services will consider all available information, including the views of the independent science panel, and will specifically address the views of the panel. These programmatic regulatory commitments shall not apply to the resulting FESA consultation. However, if as a result of the consultation, it is determined that additional reductions in CVP/SWP Delta exports will be necessary to avoid jeopardy, the USFWS or NMFS, as applicable, will identify reasonable and prudent alternatives that require the minimum level of additional reductions in CVP and SWP exports necessary to avoid jeopardy.

2. State Program-level Regulatory Commitments

The Resources Agency has concluded that the fishery benefits of federal regulation, the ERP, the EWA and the commitment and ability of the Program Agencies to make additional water available should it be needed, will be adequate to protect Bay-Delta fisheries. The Resources Agency therefore commits to ensure that there will be no reductions beyond existing regulatory levels in exports to SWP and CVP water users resulting from measures to protect fish under CESA or the NCCPA. This commitment is intended to provide certainty and stability to water users, to the extent permitted by law.

3. Program Review

(a) Annual Review

To ensure that the Milestones are substantially achieved, the Fishery Agencies will collaborate with the Science Program in the annual process of developing annual, near and long-term ERP implementation plans and priorities and the assessment of the implementation of ERP actions, including progress toward achieving the Milestones. The Fishery Agencies will also collaborate with the Science Program in the annual review of the EWA.

(b) Milestone Revisions

The Fishery Agencies expect that the Milestones will need to be revised to reflect new information derived in the annual review process identified above. The Fishery Agencies will not approve revisions to the Milestones that would either cause or allow an effect upon Covered Species or habitat designated as critical under the FESA that was not considered in the Biological

Opinions, or which would otherwise require the reinitiation of formal consultation pursuant to 50 CFR 402.16. Consequently, the USFWS and NMFS expect that proposed revisions to the Milestones that they may approve will result in equal or better protection for Covered Species. Consequently, such revisions may be appended to the USFWS' and/or NMFS' Biological Opinions, as appropriate, through informal, rather than formal consultation pursuant to 50 CFR 402.13. DFG will incorporate its approved revisions to the Milestones by amending its Natural Communities Conservation Plan.

4. Duration

The program-level regulatory commitments provided in this Section VIII extend from the Effective Date until September 30, 2004. Not later than 180 days prior to September 30, 2004, the applicable Parties will reinitiate formal consultation on the Program. The purpose of the reinitiation is to evaluate the efficacy of the EWA and progress toward achieving the Milestones in conserving and promoting the recovery of Covered Species. The reinitiation of consultation is expected to result in supplemental Biological Opinions, which could be appended to the original Biological Opinions. The Parties anticipate that sufficient fishery protection assets, either from existing sources or from water supply augmentation, will be available after September 30, 2004, in which event, this Agreement may be amended to extend the program-level regulatory commitments subsequent to and consistent with the findings of the supplemental Biological Opinions.

B. Conditions for Regulatory Commitments

In order for the regulatory commitments described in this Section VIII to be effective, the following commitments must be met:

1. The fishery protection elements of the Program must be implemented as described in the EIS/EIR, the Biological Opinions, and the ROD, including ERP and EWA implementation and full funding (at least \$150 million annually for the ERP, and an additional \$50 million annually for the EWA);
2. The Parties must provide Tier 3 measures if and when needed, as described in Section VIII.A.1;
3. Implementation of the Milestones in accordance with the Biological Opinions must be demonstrated; and
4. The initial and annual assets described in Article I, Section 2 of the EWA Agreement must be acquired for the EWA.

The Parties agree to take the actions necessary to meet these conditions. The Parties shall continuously monitor Program implementation to assure that the conditions set out above are met. In the event that any Party receives information from monitoring or any other source indicating that any of the conditions is not being met or will not be met, that Party shall notify the other Parties.

Upon such notification, the Parties will meet promptly to identify and assess measures which can be taken to remedy any noncompliance or anticipated noncompliance with the conditions, and shall immediately implement such measures. If the Fishery Agencies determine that a situation of noncompliance exists and the Parties are unable to remedy such noncompliance within such reasonable time as the Fishery Agencies may prescribe, not to exceed 60 days, the regulatory commitments will be suspended or terminated. Upon such a determination of noncompliance, formal consultation will be reinitiated and the Federal Fishery Agencies will issue new or amended biological opinions with conditions prescribing alternative regulatory requirements. If the compliance with the conditions set out above is subsequently achieved, the initial regulatory commitments may be revived and reflected through new or amended programmatic biological opinions.

Nothing in this provision will prevent the Fishery Agencies from exercising their authority described in Section VIII.A.1(c) of this Agreement.

IX. General Provisions

A. Public Officials Not To Benefit

No member of or delegate to Congress shall be entitled to any share or part of this Agreement, or to any benefit that may arise from it.

B. Availability of Appropriated Funds

1. Federal Agencies

The commitments and obligations under this Agreement of each Party that is a federal agency is subject to the requirements of the federal Anti-Deficiency Act and the availability of appropriated funds. The Parties acknowledge that this Agreement does not require any federal agency to expend its appropriated funds unless and until an authorized officer of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

The project schedules described in this document depend upon certain assumptions about state and federal budgets, optimized construction schedules, willing sellers and other contingencies. These assumptions may change as the CALFED Program progresses and appropriate revisions to the CALFED Program may be necessary. Consistent with federal law, nothing in this document constrains the discretion of the President or his successor from making whatever budgetary or legislative proposals he or his successors deem appropriate or desirable.

2. State Agencies

The commitments and obligations under this Agreement of each Party that is a State agency is subject to the availability of appropriated funds. The Parties acknowledge that this Agreement does not require any State agency to expend its appropriated funds unless and until an authorized officer of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

C. Statutory Authority

The Parties shall not construe this Agreement to require any Party to act beyond, or inconsistent with, its statutory authority.

D. Effective Date

The Effective Date of this Agreement is August 28, 2000.

E. Duration

This Agreement shall be in effect for thirty years following the Effective Date, unless extended by amendment or terminated.

F. Amendments

This Agreement may be amended by written agreement of all the Parties.

G. Addition of New Parties

Any Program Agency may execute this Agreement and thereby become a Party. Execution by a Program Agency shall not be construed as an amendment to this Agreement.

H. Withdrawal

Any Party may withdraw from this Agreement upon thirty days written notice to the other Parties. Notwithstanding withdrawal by any Party or Termination of the Agreement pursuant to Section I, below, each Party's agreement to meet the conditions set out in Section VIII.B shall remain in effect pending concurrence by the Fishery Agencies following appropriate consultation.

I. Termination

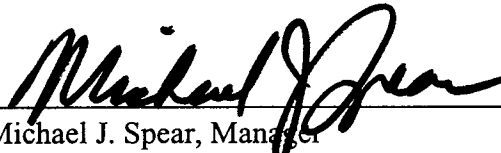
Only the Resources Secretary or the Secretary of the Interior may terminate this Agreement. Each may do so unilaterally upon thirty days written notice to the other Parties.

EXECUTION

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt this Agreement. By signing this document together, we exercise our respective authorities over only those portions relevant to our authority.

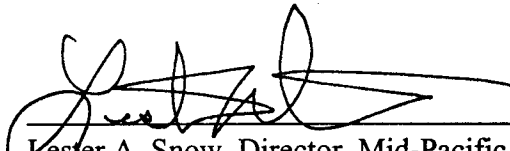
Signed and dated:

United States of America




Michael J. Spear, Manager
California-Nevada Operations
U.S. Fish and Wildlife Service

8/28/00
Date




Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation

8/28/00
Date



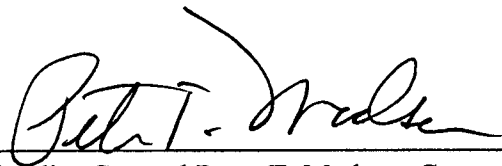
Al Wright, Acting State Director
U.S. Bureau of Land Management

8/30/00
Date




Felicia Marcus, Regional Administrator
U.S. Environmental Protection Agency

8/28/00
Date




Brigadier General Peter T. Madsen, Commander
South Pacific Division
U.S. Army Corps of Engineers

8/28/00
Date

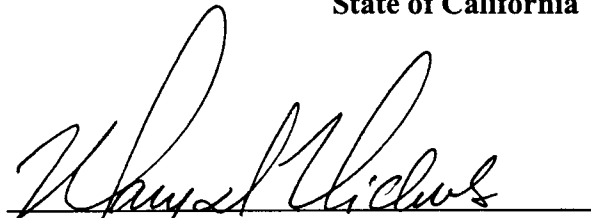

Jeffrey E. York, State Conservationist
Natural Resources Conservation Services

8-28-00
Date

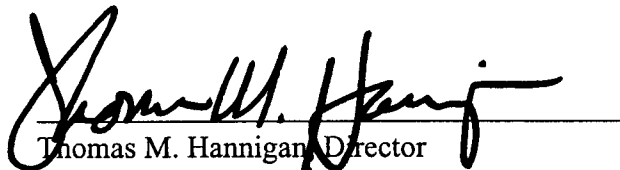

Rebecca Lent, Ph.D., Regional Administrator
National Marine Fisheries Service

8/28/00
Date


State of California


Mary D. Nichols, Secretary
California Resources Agency

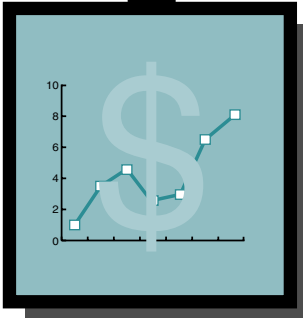
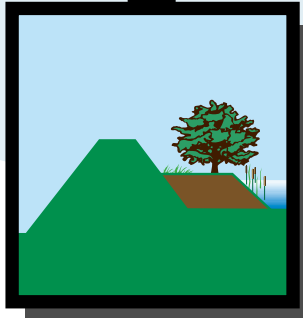
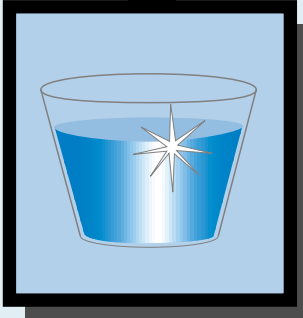
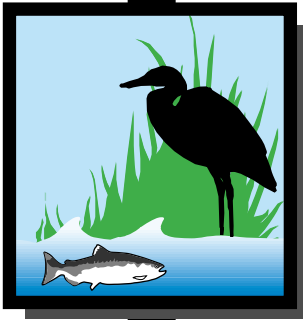
8/28/00
Date


Thomas M. Hannigan, Director
California Department of Water Resources

8/28/2000
Date


Robert C. Hight, Director
California Department of Fish and Game

8/28/00
Date



CALFED
BAY-DELTA
PROGRAM

Attachment 6a

Programmatic Endangered Species Act Section 7 Biological Opinions

U.S. Fish and Wildlife

August 28, 2000



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

IN REPLY REFER TO:
1-1-00-F-184

August 28, 2000

Memorandum

To: Regional Director, U.S. Bureau of Reclamation, Mid Pacific Region
Sacramento, California

From: Field Supervisor, Sacramento Fish and Wildlife Office
Sacramento, California

Subject: Reinitiation of Programmatic Formal Consultation and Conference on the
CALFED Bay-Delta Program (File No. 1-1-F-00-183)

This document transmits the Fish and Wildlife Service's (Service) programmatic biological and conference opinions based on the Service's review of the CALFED Bay-Delta Program (CALFED Program) and its effects on listed species and critical habitats in California. These opinions are provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act)(16 U.S.C. 1531 et seq.). The Service originally concluded formal consultation on the CALFED Program on August 23, 2000. The CALFED Agencies requested reinitiation of formal consultation on August 28, 2000, to clarify language within the project description.

These biological and conference opinions are based primarily on information provided in: (1) the July 2000, Multi-Species Conservation Strategy; (2) the July 2000 Final Programmatic EIS/EIR for the CALFED Bay-Delta Program and its Technical Appendices; (3) the Environmental Water Account Operating Principles Agreement in Appendix E; (4) additional information contained in Service files. A complete administrative record of this consultation is on file in this office.

Wayne S. White

Attachment

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Introduction

This biological opinion addresses implementation of the CALFED Bay-Delta Program (CALFED Program). The CALFED Program was developed collaboratively by 18 Federal and State agencies (CALFED Agencies) with management and regulatory responsibilities affecting the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta). The co-lead agencies for the purposes of this biological opinion are the Bureau of Reclamation (Reclamation), Fish and Wildlife Service (Service), Bureau of Land Management (BLM), Geological Survey (USGS), Army Corps of Engineers (Corps), Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), Natural Resources Conservation Service (NRCS), Forest Service (USFS), and Western Area Power Administration (WAPA). The State of California's Resources Agency is an applicant for the purposes of this consultation, and represents the California Department of Fish and Game (CDFG), Department of Water Resources (DWR) and the Reclamation Board.

CALFED Program implementation, in conjunction with the MSCS and programmatic biological opinions, will provide benefits in subsequent site specific consultations. Specifically, individual projects that qualify for consultation will be evaluated within the context of the program as a whole, which includes major elements designed to improve the environmental baseline and lead to the recovery of targeted species. These major elements will be subject to on-going monitoring, evaluation, and the application of adaptive management. Project specific biological opinions will take into account the environmental benefits that accrue from the CALFED Program. As a result, the Service and NMFS anticipate that implementation of the overall CALFED program will streamline the ESA compliance process, and benefits to listed species will reduce the need for additional provisions to satisfy legal requirements.

The CALFED Program is described in the main document of the Programmatic Environmental Impact Statement/Programmatic Environmental Impact Report (PEIS/PEIR), its technical appendices for program plans and strategies, and in its Implementation Plan and Phase II report. The **Description of the Proposed Action** in this programmatic biological opinion is based on these documents. Thus, the **Description of the Proposed Action** provides clarifications and details derived from the various documents comprising the PEIS/PEIR and is intended to provide a comprehensive description of the CALFED Program.

The PEIS/PEIR is a National Environmental Policy Act (NEPA) document that allows for future, tiered, site-specific NEPA analysis on CALFED Program actions. This programmatic biological opinion provides for a similar tiering process. Discrete CALFED Program actions will submit to tiered review under section 7 of the Federal Endangered Species Act (ESA), where appropriate.

The Multi-Species Conservation Strategy (MSCS) facilitates this process by describing a process for developing Action-Specific Implementation Plans (ASIP) consistent with the CALFED Program and ESA; and programmatic measures to avoid, minimize, and compensate for impacts to listed and proposed species, and species of special concern.

The CALFED Program has several programs designed to further the purposes of ESA. These programs are an inseparable part of the CALFED Program, and include the Ecosystem Restoration Program (ERP), MSCS, Water Quality Program (WQP), Environmental Water Account (EWA) and its Operating Principles, and implementation strategies including monitoring and adaptive management. Commitments to uphold the ESA by CALFED Agencies, combined with implementation of the programs and commitments as described in the **Description of the Proposed Action**, contributed to the Service's decision-making process leading to a **Conclusion** of no jeopardy or adverse modification. The no-jeopardy conclusion at this programmatic scale is not intended to, and does not, preclude the Service from making a future jeopardy determination for a project-specific action, based on the effects analysis. However, the (1) monitoring and adaptive management, (2) communication, cooperation, and outreach, (3) agency commitments regarding conservation, restoration, compensation, and commitments to work together to recover listed species, and (4) project-specific consultation all diminish the likelihood of future jeopardy opinions tiered under this programmatic biological opinion.

This consultation is intended to address in a comprehensive manner the numerous and widely varied actions related to the implementation of the CALFED Program. While CALFED Program actions are clearly interrelated and interdependent, many actions implemented by the various CALFED Agencies are not and should not be considered as stand alone actions. Nevertheless, the Service and NMFS have agreed with the other CALFED Agencies that to facilitate ESA compliance, the activities that are listed in the **Description of the Proposed Action** would be evaluated as a suite of actions all related in one form or another to the CALFED Program. Therefore, this biological opinion addresses the effects upon listed species resulting from the implementation of this suite of actions as a whole and also provides a strategy, or process, as to how ESA compliance on the individual activities that cumulatively make up the CALFED Program will be accomplished.

A number of key program actions related to the implementation of a variety of activities, especially those related to addressing the needs of listed species, are considered in developing this biological opinion at the programmatic level. These key program actions are critical to the overall determination of how implementation of this suite of actions may, or may not jeopardize listed species because the effects of the actions are evaluated in the aggregate. If key program actions are not implemented at this programmatic level, or new information becomes available,

consultation would be reinitiated at the programmatic level to ascertain how the lack of implementation of any action(s), or new information, affects the evaluation of effects upon listed species associated with the overall implementation of the suite of actions being considered and the subsequent conclusions made in this biological opinion.

The project-specific or tiered consultations that will follow this programmatic consultation will rely on implementation of the key program actions to direct the development and implementation of the project-specific actions. If the CALFED Program fails to implement conservation measures or if new information becomes available, reinitiation on the programmatic level may be necessary.

The Service and other CALFED Agencies have consulted on numerous large-scale projects and plans that impact species protected under the ESA. The results of these consultations have been biological opinions that stand on their own merits, establish thresholds to ensure survival and recovery of listed species, and establish a baseline for the effects considered by subsequent consultations. Of particular note are: the Service's October 15, 1991, biological opinion on the Friant Water Contract Renewals (Friant, Service file #1-1-91-F-22); the Service's December 27, 1994, biological opinion on Interim Water Contract Renewal (Interim, Service file #1-1-94-F-69); the Service's November 2, 1994, biological opinion on the Environmental Protection Agency's Water Quality Standards for the San Francisco Bay/Sacramento-San Joaquin Rivers and Delta (Service file #1-1-93-F-61), the Service's March 6, 1995, biological opinion on Reclamations's Long-term Operations Criteria and Plan [(OCAP), Service file #1-1-94-F-70]; and the Service's opinions on the Los Vaqueros Project—in particular the September 9, 1993, opinion (Los Vaqueros, Service file #1-1-93-F-35). This biological opinion is based on the understanding that the thresholds identified in those earlier opinions are a part of the baseline for this consultation. Actions that are not consistent with the project description in this document have not been analyzed for their impacts on the survival and recovery of listed and proposed species.

To implement long-range planning and to assure efficient and effective implementation of the CALFED Program and ESA, the CALFED Agencies, which includes the Service, NMFS, and CDFG (Fish and Wildlife Agencies), will continue coordination on: (1) development of ASIPs for future tiered CALFED Program actions; (2) identification and implementation of conservation actions needed to minimize the impact of the CALFED Program on listed species; and (3) continually monitoring, evaluating, and adapting the program based upon new information.

Although this document is intended to dovetail with the NEPA process, it should be noted that Categorical Exclusions from NEPA are not exempt from compliance with the ESA. The ESA guidance in this opinion is intended to be followed based on effects to listed species. Any ancillary or exclusionary language from laws other than the ESA should not be used to bear upon

any effects determinations that are made relative to listed species.

Numerous acronyms are used for actions and projects within the CALFED Program. In this document use of acronyms has been limited to those entities, acts, and descriptors that are referred to frequently. A list of these acronyms is provided on the following pages in Table 1.

Table 1. Acronyms used in this opinion

af	acre-feet
ASIP	Action Specific Implementation Plan
AWMC	Agricultural Water Management Council
BDAC	Bay-Delta Advisory Committee
BLM	U.S. Bureau of Land Management
BMP	best management practice
CALFED	Eighteen Federal and State agencies
CCA	candidate conservation agreements
CCWD	Contra Costa Water District
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CMARP	Comprehensive Monitoring, Assessment, and Research Program
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVP-OCAP	Central Valley Project-Operations Criteria and Plan
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act

DCC	Delta Cross Channel
DO	dissolved oxygen
E/I Ratio	Export-Inflow Ratio
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ERPP	Ecosystem Restoration Program Plan
ESA	Federal Endangered Species Act
EWA	Environmental Water Account
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
FMWT	fall midwater trawl survey
Gap GIS	California Gap Analysis landcover geographic information system
GIS	geographic information system
HCP	Habitat Conservation Plan
IA	implementing agreement
ISI	integrated storage investigation
MAF	million acre-feet
“M” goal	maintain the species
MOU	Memorandum of Understanding
MSCS	Multi-Species Conservation Strategy
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOD	Notice of Determination
O&M	Operation and Maintenance
OCAP	Operations Criteria and Plan

PG&E	Pacific Gas & Electric Company
pH	measure of acidity or alkalinity
PL	Public Law
PEIS/PEIR	Programmatic Environmental Impact Statement/ Programmatic Environmental Impact Report
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
“r” goal	contribute to recovery of the species
“R” goal	recovery of the species
Reclamation	U.S. Bureau of Reclamation
ROD	Record of Decision
Service or USFWS	U.S. Fish and Wildlife Service
SB	Senate Bill
SJRA	San Joaquin River Agreement
SRA	shaded riverine aquatic
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VAMP	Vernalis Adaptive Management Program
WAPA	Western Area Power Administration
WQCP	Water Quality Control Plan
WQP	Water Quality Program

WUE	Water Use Efficiency Program
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Study Area

The area addressed in this biological opinion (Appendix A) includes the legal Delta, Suisun Bay and Marsh, lands within the Central Valley watershed, the upper Trinity River watershed, the southern California water system service area, San Pablo Bay, and San Francisco Bay. The CALFED Program study area also includes portions of the Pacific Ocean out to the Farallon Islands, and a near-shore coastal zone that extends from about Morro Bay to the Oregon border. This latter area is not addressed in this biological opinion.

This biological opinion addresses the following three distinct geographic subareas:

- MSCS Focus Area. This area (Appendix A, Figures A-1 and A-2) includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries downstream of major dams, and the potential locations of reservoirs.
- Other Service Areas. This area (Appendix A, Figure A-1) includes other State Water Project (SWP) and Central Valley Project (CVP) service areas that are located outside of the MSCS Focus Area and the Watershed Program Area.
- Watershed Program Area. This area (Appendix A, Figure A-1) encompasses the entire upper watersheds of the Central Valley including those areas located above and below major dams and outside the MSCS Focus Area and other service areas, and a portion of the upper Trinity River watershed.

A total of 126 listed and proposed species occur or potentially occur in the MSCS focus area (Appendix B).

CONSULTATION HISTORY

The CALFED Program was initiated in May 1995 by then Governor Pete Wilson and the Clinton Administration to address environmental and water management problems associated with the Bay-Delta. In June 1995, State and Federal agencies launched a partnership to develop and implement a comprehensive, long-term management plan for the Bay-Delta. The management plan is intended to address problems of the Bay-Delta system within four critical, often competing, resource categories: ecosystem quality, water quality, levee system integrity, and water supply reliability. The CALFED Program officially involves the 18 CALFED Agencies with management or regulatory responsibilities in the Bay-Delta. Stakeholder input was facilitated through the Bay-Delta Advisory Committee (BDAC).

At its inception, the CALFED Program was divided into two planning phases (Phase I and II) and an implementation phase (Phase III). During Phase I, the CALFED Program concentrated on identifying and defining the problems confronting the Bay-Delta system. A mission statement and guiding principles were developed, along with CALFED Program objectives and an array of potential actions to meet them. Phase I was completed in September 1996.

During Phase II the CALFED Program developed a preferred program alternative (Preferred Program Alternative) and conducted a comprehensive programmatic environmental review process. Because the CALFED solution area is so large, and because it is approaching its task in an integrated, comprehensive way, environmental review must be conducted on a very broad level. Phase II ends following the signing of a Federal Record of Decision (ROD) and State Certification of the Final PEIS/PEIR. Phase III will begin with implementation of the CALFED Program. The CALFED Program solution plan is expected to take 30 years or more to complete.

Early in Phase I, from July 1995 to July 1996, the co-lead Federal CALFED Agencies held more than 30 public meetings and workshops around the State to involve Californians in developing a Bay-Delta solution. The participating Federal agencies included the NMFS, NRCS, Corps, Reclamation, EPA, and the Service. The problems of the Bay-Delta were defined and a range of alternative solutions was developed. Additionally, three preliminary alternatives for Delta water conveyance were identified for further analysis during Phase II. The first conveyance configuration relied primarily on the existing conveyance system, with some minor changes in the south Delta. The second configuration relied on enlarging channels within the Delta. The third configuration included in-channel modifications and a conveyance channel that would move some water around the Delta. Each of these alternatives also included new ground and surface water storage options. Proposed management actions were grouped into six CALFED Program elements (i.e., levee system integrity, water quality improvements, ecosystem restoration, water

use efficiency measures, water transfers, and watershed management). In February 1996, the CALFED Program released 20 draft alternative solutions, each including hundreds of actions to help solve the Bay-Delta problems.

CALFED Agencies participated on management and technical teams (e.g., the MSCS teams, and the Ecosystem Restoration Program [ERP] Focus Group) and contributed to several planning documents developed during Phase II, including the Draft (March 1998) and Final (July 2000) PEIS/PEIR; and Administrative Draft (March 31, 2000), Draft (April 17, 2000) and Final (July 2000) MSCS, which serves as the biological assessment for the CALFED Program section 7 consultation.

In June 1996, the list of alternatives was refined to three conceptual comprehensive approaches. In September 1996, the CALFED Agencies released the Phase I Final Report and launched a two-year environmental review of the conceptual alternative solutions. This action concluded Phase I of the CALFED Program and moved it into Phase II.

From June 1996 to December 1997, the CALFED Agencies held hundreds of public meetings to continue to involve the public in the process. Technical staff from various agencies worked with stakeholders to further refine the list of alternatives.

From March 1997 to November 1997, the CALFED Agencies released draft reports for four programs that were common to all of the alternatives. These draft reports included: the Ecosystem Restoration Program Plan, the Water Quality Component Report, the Water Use Efficiency Report, and the Delta Levee System Integrity Program Report.

In December 1997, more than \$60 million in ecosystem restoration program projects were funded. This led to an additional \$24 million in ecosystem restoration projects being funded in February 1998.

On March 16, 1998, the CALFED Agencies released a draft PEIS/PEIR containing the refined draft alternatives. The release was followed by a 105-day public comment period, which ended on July 1, 1998. Additionally, during the March 16, 1998 to July 1, 1998 time frame, the CALFED Agencies conducted further technical analyses to develop the draft Preferred Program Alternative, while also hosting public meetings, hearings, and workshops to continue to get public input.

In September 1998, another \$25.5 million in ecosystem restoration projects were funded. In December 1998, the CALFED Agencies issued the Revised Phase II Report and draft framework plan for a Preferred Program Alternative.

On June 25, 1999, the CALFED Agencies released a revised draft PEIS/PEIR, which was followed by a 90-day comment period.

In July 2000, the CALFED Agencies released the final PEIS/PEIR which was followed by a 30-day comment period.

On August 18, 2000, the Service received a request for initiation from Reclamation, which is acting as the lead agency on behalf of all the Federal CALFED Agencies.

BIOLOGICAL AND CONFERENCE OPINIONS

Description of the Proposed Action

CALFED Bay-Delta Program

The CALFED Program is a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program addresses issues in four general problem areas: ecosystem quality, water quality, water management, and levee system integrity. The following CALFED Program components were developed to solve issues in the problem areas:

- Levee System Integrity Program
- Water Quality Program
- Ecosystem Restoration Program
- Water Use Efficiency Program
- Water Transfer Program
- Watershed Program
- Storage
- Conveyance
- Environmental Water Account
- Science Program
- Multi-Species Conservation Strategy
- Governance

Most CALFED Program elements are described in technical appendices to the PEIS/PEIR. Storage and Conveyance are described separately. The EWA is an operational strategy intended to improve fish protection while not adversely affecting water supply.

All aspects of the CALFED Program are interrelated and interdependent. Ecosystem restoration is dependent upon supply and conservation. Supply is dependent upon water use efficiency and consistency in regulation. Water quality is dependent upon water use efficiency and consistency in regulations, improved conveyance, levee stability and healthy watersheds.

The CALFED Program includes a framework guiding implementation that addresses the scope, complexity, and duration of the CALFED Program, and the relative uncertainty regarding the CALFED Program's approach in resolving issues in the problem areas. Implementation is supported by an Implementation Plan that describes Stage 1 actions, CALFED Program integration, governance, and financing. In addition, a Science Program is included to carry out monitoring, assessment and research; and a MSCS will be followed to achieve compliance with the ESA. Implementation of the CALFED Program will be guided by an adaptive management approach with monitoring of performance to help modify (adapt) future actions and contribute to decision making. Also, the CALFED Program will be guided by the principle of balanced implementation of CALFED Program elements.

The term of this programmatic biological opinion includes Phase III of the CALFED Program (30 years or more), provided the CALFED Program remains in compliance with this programmatic biological opinion. The Service will evaluate the CALFED Program's consistency with this biological opinion at numerous points in the future, including:

- During review of annual reports submitted by the CALFED Program.
- During subsequent, tiered informal and formal consultation on ASIPs.
- After 4 years of implementation when sufficient data is collected and analyzed to fully evaluate the effectiveness of the WMS, together with other conservation elements, in meeting the conservation objectives of the CALFED Program.
- At the conclusion of Stage 1 to assess the Program's compliance in achieving the conservation objectives established in the CALFED "Milestones."

If the Service determines that the CALFED Program is not in compliance with this biological opinion, the CALFED Agencies will reinstate this programmatic consultation. In addition, refer to the Reinitiation Statement in this consultation for further reasons for reinitiation.

The following sections describe the CALFED Program and its elements in greater detail.

Levee System Integrity Program

The Levee System Integrity Program's goal is to improve levees and levee management in the legal Delta and will investigate the level of levee work in Suisun Marsh, which together define its scope. All projects under the Levee System Integrity Program will be implemented to be fully consistent with other CALFED Program elements, including the ERP, Conveyance, and MSCS. Project-specific plans will incorporate appropriate elements of these other programs and strategies. Individual projects pursued under the Levee System Integrity Program, including each of the levee plans described below, will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA. The Levee System Integrity Program is comprised of the following five elements in the Delta, and a plan for Suisun Marsh levees:

Delta Levee Base Level Protection Plan. The CALFED Program will provide funding to participating local agencies in the Delta to reconstruct certain Delta levees to a uniform, base-level standard. The tentative standard is the Public Law (PL) 84-99 Delta Specific Standard (PL 84-99). Constructing levees to the PL 84-99 criteria is a prerequisite for, but not a guarantee of, post-flood Federal disaster assistance. This plan will evaluate the estimated 520 miles of non-Federal levees in the Delta and recommend levee segments that should conform with the Delta Specific Standard criteria. In addition, a funding mechanism will be established to support the routine inspection and maintenance of levees in the Delta, and for emergency response.

Delta Levee Special Improvement Projects. These projects will target areas that will provide flood protection above base-level standards for some islands protecting public benefits such as water quality, the ecosystem, life and personal property, agricultural production, cultural resources, recreation, and local and Statewide infrastructure. The scope of the Delta Levee Special Improvement Projects encompasses the Delta and levees bordering the northern Suisun Bay from Van Sickle Island to Montezuma Slough. Maintenance of upgraded levees will occur in conformance with specific criteria, consistent with meeting ERP objectives.

Delta Levee Subsidence Control Plan. The goal of this plan is to minimize the risk to levee integrity from land subsidence, in coordination with other CALFED Program elements. Measures will be implemented to reduce, eliminate, or reverse subsidence within a "zone of influence" (approximately 0-500 ft) adjacent to affected levees. Subsidence control techniques include:

- Geotechnical engineering principles and practices in conjunction with proven construction methods.
- Modifying seepage control, dewatering efforts, excavations, and land management activities near levees to best manage levee integrity.
- Strategically locating and constructing stability and drainage berms.
- Restricting practices such as land leveling, ditching, and certain other ground surface modifications within the zone of influence.
- Promoting high ground water levels and vegetation growth, where appropriate, to limit subsidence due to oxidation.

Delta Levee Emergency Management and Response Plan. The goals of this plan are to enhance existing emergency management response capabilities in the Delta, and to develop a stable funding source for emergency response. Future planning will concentrate on improving funding, resources, and response by State and Federal agencies; integrating response by all levels of government; clarification of regulatory procedures; and improving dispute resolution procedures.

Delta Levee Risk Assessment and Risk Management Strategy. The goals of this strategy are to quantify the risks to Delta levees, evaluate the consequences, and develop an appropriate risk management strategy by the end of Stage 1.

Suisun Marsh Levee System Plan. The CALFED Program will evaluate whether to include the Suisun Marsh levee system in the Levee Integrity Plan, and, if included, what level of protection is appropriate. This plan will evaluate the appropriate level of protection for Suisun Marsh levees, evaluate the best method of protection, and implement the method during Stage 1. This plan may protect part of the levee system by rehabilitating and maintaining some levees to protect managed wetlands and develop new tidal wetlands. Implementation will incorporate ERP and MSCS actions, consistent with Service-approved recovery plans.

Proposed Levee System Integrity Program Stage 1 Actions

The CALFED Agencies will evaluate the following Levee System Integrity Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Levee System Integrity Program.

- Initiate the Levee Program Coordination Group. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation

- districts, farm bureaus, other interest groups, and the general public to assure participation in planning, design, implementation, and management of levee projects (yr 1).
- Obtain short-term Federal and State funding authority as a bridge between the existing Delta Flood Protection Authority (AB 360) and long-term levee funding (yr 1-5).
 - Obtain long-term Federal and State funding (yr 1-7).
 - Conduct project level environmental documentation and obtain appropriate permits for each action/group of actions (yr 1-7).
 - Implement demonstration projects for levee designs, construction techniques, sources of material, reuse of dredge material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e., construction) and long-term (i.e., maintenance and design) ecosystem benefits, and provide increased information (yr 1-7).
 - Adaptively coordinate Delta levee improvements with ecosystem improvements by incorporating successful techniques for restoring, enhancing, or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (yr 1-7).
 - Fund levee improvements up to PL 84-99 criteria in Stage 1; e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements (yr 1-7).
 - Further improve levees which have significant Statewide benefits in Stage 1; e.g., State-wide benefits to water quality and highways (yr 1-7).
 - Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements (yr 1-7).
 - Enhance existing emergency response plans; e.g., establish a revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contacts for flood fighting and recovery operations, and outline environmental considerations during emergencies (yr 1-7).
 - Implement current Best Management Practices (BMPs) to correct subsidence effects on levees. Assist CALFED Program's Science Program activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED Program objectives (yr 1-7).
 - Develop BMPs for the reuse of dredge materials (yr 1).
 - Institute a program for using Bay and Delta dredge material to repair Delta levees and restore Delta habitat (yr 1-7).
 - Complete total risk assessment for Delta levees and develop and begin implementation of risk assessment options as appropriate to mitigate potential consequences (yr 1-7).

- Complete the evaluation of the best method for addressing the Suisun Marsh levee system (yr 1-2).

Water Quality Program

The CALFED Program's WQP will strive to create water quality conditions that fully support a healthy and diverse ecosystem and the multiplicity of human uses of water. The geographic scope of the WQP encompasses five regions: the legal Delta; the Bay Region which includes Suisun Bay and Marsh, San Pablo Bay, and the San Francisco Bay watershed; the Sacramento River Region, bounded by the ridge tops of the Sacramento River watershed or hydrologic region; the San Joaquin River Region which includes both the San Joaquin River and Tulare Lake hydrologic basins; and, SWP and CVP service areas outside the Central Valley.

The CALFED Program's Water Quality Technical Group has identified the following water quality parameters of concern to beneficial uses: mercury, selenium, trace metals (copper, cadmium, and zinc), pesticides (carbofuran, chlorodane, chloropyrifos, DDT, diazinon, PCBs, and toxaphene), drinking water disinfection by-product precursors (bromide and total organic carbon), dissolved oxygen and oxygen reducing substances, ammonia, salinity (total dissolved solids), temperature, turbidity and sedimentation, pathogens, nutrients (nitrogen and phosphorus), pH (alkalinity), chloride, boron, sodium absorption ratio, and toxicity of unknown origin. These parameters provide the focal points for developing and implementing the CALFED Program's water quality actions. The July 2000 Water Quality Program Plan, a technical appendix to the CALFED Program's Final PEIS/PEIR, provides a full description of the WQP. Individual projects pursued under the WQP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA.

Water Quality Program Plan

The Water Quality Program, largely through its agency-stakeholder Water Quality Technical Group, has developed programmatic actions to address water quality parameters of concern and beneficial use impairments. Water quality impairments or problems and associated programmatic actions to treat these problems are described in the WQP Plan. The WQP Plan is organized by the following sections: low dissolved oxygen and oxygen depleting substances, drinking water, mercury, pesticides, organochlorine pesticides, salinity, selenium, trace metals, turbidity and sedimentation, toxicity of unknown origin, and a section on implementation strategy. The environmental water quality components, including proposed actions, were transferred to and are now administered under the ERP. However, to maintain consistency between the Draft PEIS and Final PEIS, CALFED Agencies have left the environmental components in the WQP Plan.

Proposed Water Quality Program Stage 1 Actions

The CALFED Agencies will evaluate the following water quality actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WQP Plan.

General Water Quality Actions

- Prepare project level environmental documentation and permitting as needed (yr 1-7).
- Coordinate with other CALFED Program elements to ensure that in-Delta actions maximize potential for Delta water quality improvements (yr 1-7).
- Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).

Environmental Water Quality Action:

Conduct the following mercury evaluation and abatement work:

Cache Creek:

- Risk appraisal and advisory for human health impacts of mercury (yr 1-5).
- Support development and implementation of Total Maximum Daily Load (TMDL) for mercury (yr 1-7).
- Determine bioaccumulation effects in creeks and the Delta (yr 1-4).
- Source, transport, inventory, mapping and speciation of mercury (yr 1-7).
- Information Management/Public Outreach (yr 5-7).
- Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate (yr 3-5).
- Investigate sources of high levels of bioavailable mercury (yr 4-7).

Sacramento River:

- Investigate sources of high levels of bioavailable mercury; inventory, map, and refine other models (yr 3-7).
- Participate in remedial activities (yr 7).

Delta:

- Research methylization (part of bioaccumulation) process in Delta (yr 1-2).
- Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 3-7).
- Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 3-5).

Conduct the following pesticide work:

- Develop diazinon and chlorpyrifos hazard assessment criteria with the CDFG and the Department of Pesticide Regulations (yr 1).

- Support development and implementation of a TMDL for diazinon (yr 1-7).
- Develop BMPs for dormant spray and household uses (yr 1-3).
- Study the ecological significance of pesticide discharges (yr-1-3).
- Support implementation of BMPs (yr 2-7).
- Monitor to determine effectiveness (yr 4-7).

Conduct the following trace metals work:

- Determine spatial and temporal extent of metal pollution (yr 3-7).
- Determine ecological significance and extent of copper contamination (yr 1-3).
- Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).
- Participate in Brake Pad Partnership to reduce introduction of copper (yr 1-7).
- Partner with municipalities on evaluation and implementation of stormwater control facilities (yr 2-5).
- Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (yr 2-7).

Conduct the following selenium work:

- Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
- Evaluate and, if appropriate, implement real-time management of selenium discharges (yr 1-7).
- Expand and implement source control, treatment, and reuse programs (yr 1-7).
- Coordinate with other programs (yr 1-7); e.g., recommendations of San Joaquin Valley Drainage Implementation Program, and CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways.

Conduct the following sediment reduction work/organochlorine pesticides:

- Participate in implementation of the United States Department of Agriculture (USDA) sediment reduction program (yr 1-7).
- Promote sediment reduction in construction areas and urban stormwater, and other specific sites (yr 1-7).
- Implement stream restoration and revegetation work (yr 4-7).
- Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
- Coordinate with ERP on sediment needs (yr 1-3).

Conduct the following work addressing dissolved oxygen (DO) and oxygen depleting substances (including nutrients):

- Complete studies of causes for DO sag in San Joaquin River near Stockton (yr 1-2).
- Define and implement corrective measures for DO sag (yr 1-7).

- Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
- Develop inter-substrate DO testing in conjunction with the ERP (yr 2-4).
- Study nutrient effects on beneficial uses (yr 4-7).
- Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations (yr 1-7).
- Support finalizing investigation of methods to reduce constituents that cause low DO for inclusion in TMDL recommendation by the Central Valley Regional Water Quality Control Board (yr 2).
- Support finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River (yr 2).
- Support implementation of appropriate source and other controls as recommended in the TMDL (yr 3).
- Participate in identifying unknown toxicity and addressing as appropriate (yr 1-7).

Drinking Water Quality Actions

Actions specific to drinking water improvements:

- Work with Bay Area water suppliers as they develop a Bay Area Blending/Exchange Project (yr 1-7).
- Address drainage problems in the San Joaquin Valley to improve downstream water quality (yr 1-7).
- Implement source controls in the Delta and its tributaries (yr 1-7).
- Support ongoing efforts of the Delta Drinking Water Quality Council (yr 1-7).
- Invest in treatment technology demonstrations (yr 1-7).
- Control runoff into the California Aqueduct and other similar conveyances (yr 1-7+).
- Address water quality problems at the North Bay Aqueduct (yr 1-7).
- Conduct comprehensive evaluations, pilot programs, and full scale actions to reduce Total Organic Carbon (TOC) contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvements (yr 1-7).
- Improve DO concentrations in the San Joaquin River near Stockton (yr 1-3).
- Study recirculation of export water to reduce salinity and improve DO in the San Joaquin River. If feasible, and consistent with ERP goals and objectives, implement a pilot program (yr 1-4).

Ecosystem Restoration Program

The Ecosystem Restoration Program (ERP) will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta estuary and its watershed to support sustainable populations of diverse plant and animal species. All CALFED Program elements will contribute in varying degrees to this goal, with the ERP being the principal CALFED Program element designed to restore the ecological health of the Bay-Delta system. The ERP includes actions throughout the Bay-Delta watershed, focusing on the restoration of ecological processes and important habitats. The CALFED Program proposes to improve ecosystem quality for the Bay-Delta system in order to reduce conflicts among beneficial uses of California's water. Individual projects pursued under the ERP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA.

The primary geographic focus area of the ERP is the Sacramento-San Joaquin Delta, Suisun and San Pablo Bay, the Sacramento River below Shasta Dam, the San Joaquin River below the confluence with the Merced River, and their major tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. This primary geographic focus area is divided into 14 ecological management zones (discussed in Ecosystem Restoration Program Plan Volume II). The secondary geographic focus area is the upper watersheds surrounding the primary focus area and Central and South San Francisco Bay and their local watersheds.

Success of the CALFED Program hinges upon the full and successful funding and implementation of the ERP, MSCS, other existing and tiered biological opinions, as well as other environmental commitments. Although it is anticipated that some ERP actions will be refined or altered, based upon new information and adaptive management, the successful implementation of nearly all actions is necessary to achieve the species recovery goals identified in the ERP. The ERP is not designed as mitigation for projects to improve water supply reliability or to bolster the integrity of Delta levees, although it is expected that the environmental benefits associated with implementation of the ERP will facilitate the review of such projects. Improving ecological processes and increasing the amount and quality of habitat are co-equal with other CALFED Program goals related to water supply reliability, water quality, and levee system integrity.

The ERP is comprised of a Strategic Plan and a two-volume restoration plan: Volume I which describes the ecosystem elements or attributes (ecological processes, habitats, species and species groups, and anthropogenic stressors) the program addresses; and, Volume II which presents the ecological management zones and proposed programmatic actions. The ERP would require individual section 7 consultations for actions which may affect listed species.

Ecosystem Restoration Program Strategic Plan and Goals

The ERP Strategic Plan contains the following goals and objectives:

- Goal 1: Achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in San Francisco Bay and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
- Goal 2: Rehabilitate natural processes in the Bay-Delta estuary and its watershed to fully support, with minimal ongoing human intervention, natural aquatic and associated terrestrial biotic communities and habitats, in ways that favor native members of those communities.
- Goal 3: Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP goals.
- Goal 4: Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.
- Goal 5: Prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.
- Goal 6: Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

There are several objectives under each goal. ERP goals and objectives are integrated with those of the CALFED Program's MSCS, WQP, and Nonnative Invasive Species Strategic Plan.

The ERP Strategic Plan also presents and describes:

- An ecosystem based management approach for restoring and managing the Bay-Delta ecosystem.
- An adaptive management process that is sufficiently flexible and iterative to respond to changing Bay-Delta conditions and to incorporate new information about ecosystem structure and function.
- The value and application of conceptual models in developing restoration actions and defining information needs, with examples of their development and use.
- Institutional and administrative considerations necessary to implement adaptive management, to ensure scientific credibility of the restoration program and to engage the public in the restoration program.

- Decision rules and criteria to help guide the selection and prioritization of restoration actions.
- Opportunities and constraints to be considered in developing a restoration program.

Ecosystem Restoration Program Plan

The Ecosystem Restoration Program Plan (ERPP) is composed of two volumes. Volume I presents the elements or components of the ERP. These “ecosystem elements” are organized into four categories: ecological processes (e.g., central valley stream flows, Bay-Delta hydrodynamics, bay-delta aquatic foodweb); habitats (e.g., tidal perennial aquatic, saline emergent wetland, riparian and riverine aquatic); species and species groups (species designated for recovery, species designated for contribute to recovery, species assemblages designated for enhance and/or conserve biotic communities, harvested species to be maintained and/or enhanced); and, stressors (e.g., water diversions, nonnative invasive species, contaminants, gravel mining). Consult ERPP Volume I for the complete list and description of ERP ecosystem elements (total of 106 elements).

ERPP Volume II identifies over 600 programmatic actions to be implemented throughout the Bay-Delta estuary and its watershed over the 30-year period of the CALFED Program. Volume II also gives targets for the ecosystem elements (e.g., acres of tidal fresh emergent wetland to be restored). Volume II is organized by Ecological Management Zones. The primary ERP geographic focus area is divided into 14 Ecological Management Zones: Sacramento-San Joaquin Delta, Suisun Marsh/North San Francisco Bay, Sacramento River, North Sacramento Valley, Cottonwood Creek, Colusa Basin, Butte Basin, Feather River/Sutter Basin, American River Basin, Yolo Basin, Eastside Delta Tributaries, San Joaquin River, East San Joaquin, and West San Joaquin. Each zone is further divided into Ecological Management Units. Under each Ecological Management Zone are the ecosystem elements and associated proposed programmatic actions and restoration targets that the ERP will address in that zone. There is also a section in Volume II that gives ERP targets, MSCS species goal prescriptions, and MSCS conservation measures for species and species groups ecosystem elements.

Proposed Ecosystem Restoration Program Stage 1 Actions

CALFED Agencies will evaluate the following ERP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the ERP:

- Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning design, implementation, and management of ecosystem restoration projects (yr 1-7).
- Conduct project level environmental documentation and permitting as needed for each bundle of Stage 1 actions (yr 1-7).
- Fully coordinate with other ongoing activities which address ecosystem restoration in the Bay-Delta system; e.g., CVPIA, Four Pumps Agreement, Non-native Invasive Species Task Force (yr 1-7).
- Implement habitat restoration in the Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function and facilitate recovery of endangered species consistent with the goals of the ERP Strategic Plan and MSCS. Habitat restoration efforts in Stage 1 will: restore 2,000 acres of tidal perennial aquatic habitat; restore 200 acres of deep open water nontidal perennial aquatic habitat; restore 300 acres of shallow open water nontidal perennial aquatic habitat; enhance and restore 50 miles of Delta slough habitat; enhance and restore 50 to 200 acres of midchannel islands; restore 8,000 to 12,000 acres of fresh emergent (tidal) wetlands; restore 4,000 acres of fresh emergent (non-tidal) wetlands; restore 25 miles of riparian and riverine aquatic habitat; restore 1,000 to 2,000 acres of perennial grassland; and establish 8,000 to 12,000 acres of wildlife-friendly agricultural habitat. These actions represent approximately one-fourth of the acreage identified in the ERP to be restored during the 30-year implementation period (yr 1-7).
- Implement large-scale restoration projects on select streams and rivers (e.g., Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in later stages (yr 1-7).
- Implement an EWA that acquires water for ecosystem and species recovery needs, substantially through voluntary purchases in the water transfer market in its first few years and developing additional assets over time (yr 1-7).

- Pursue full implementation of ERP upstream flow targets, over and above EWA assets and regulatory actions, through voluntary purchases of at least 100,000 acre-feet of water by the end of Stage 1. Evaluate how the ERP water acquisitions and EWA water acquisitions will be integrated most effectively (yr 1-7).
- Complete targeted research and scientific evaluations needed to resolve the high priority issues and the uncertainties identified in the ERP Strategic Plan (e.g., instream flow, non-native organisms, and Bay-Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in later stages (yr 1-7).
- Establish partnerships with universities for focused research (yr 1-7).
- Acquire floodplain easements, consistent with ecosystem and flood control needs along the Sacramento and San Joaquin Rivers (yr 4-7).
- Continue high priority actions that reduce direct mortality to fishes (yr 1-7):
 - Screen existing unscreened or poorly screened diversions in the Delta, on the Sacramento River, San Joaquin River, and tributary streams based on a systematic priority approach.
 - Remove select physical barriers to fish passage.
- Continue gravel management, e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries. Most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites (yr 1-7).
- Develop and begin implementing a CALFED Program comprehensive non-native (exotic) invasive species prevention, control, and eradication plan including the following (yr 1-7):
 - Implement invasive plant management program in Cache Creek.
 - Develop ballast water management program.
 - Develop early-response invasive organism control programs.
 - Evaluate CALFED Program implementation actions and how those actions may benefit non-native species to the detriment of native species or the Bay-Delta ecosystem.
- Provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above, e.g., pursue actions that are opportunity-based (willing sellers, funding, permitting), provide incremental improvements on private land through incentives, and develop partnerships with farmers on “environmentally friendly” agricultural practices (yr 1-7).
- Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
- Evaluate the feasibility of harvest management to protect weaker fish stocks (yr 1-7).
- Implement projects on selected streams to provide additional upstream fishery habitat by removing or modifying barriers (yr 1-7).

- Assist in the preparation of detailed, ecosystem-based restoration and recovery plans for any priority species identified in the ERP Strategic Plan and the MSCS for which up-to-date plans are not available. Begin implementing appropriate additional restoration actions identified in these plans (yr 1-7).
- Identify and advance specific regional ERP goals (yr 1-7).

Additional draft ERP Stage 1 actions are presented by Ecological Management Zone in Appendix D of the ERP Strategic Plan.

Water Use Efficiency Program

The Water Use Efficiency Program (WUE) relies on a combination of technical assistance, incentives, and directed studies for the four WUE program elements: Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands.

Technical assistance programs and directed studies will begin for all four elements. Incentive programs will be designed to award CALFED Program grant funding for projects that demonstrate potential to provide the CALFED Program water supply reliability, water quality, or ecosystem restoration benefits.

The WUE Program includes water conservation and water recycling actions to facilitate efficient use of water at the regional and local level. Individual projects pursued under the WUE will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA. The programmatic water use efficiency actions include the following:

Water Conservation Related Actions

- Work with the California Urban Water Conservation Council and the Agricultural Water Management Council (AWMC) to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and, in the case of the urban effort, identify a proper entity and process to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- Expand State and Federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.
- Assist urban water suppliers comply with the Urban Water Management Planning Act.

- Assist water suppliers and water users to identify and implement water management measures that can yield multiple benefits, including improved water quality and reduced ecosystem impacts.
- Identify and implement practices to improve water management on managed wetlands.
- Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
- Identify, in region-specific Strategic Plans for Agricultural Areas, quantifiable objectives to assure improvements in water management.

Water Recycling Actions:

- Assist local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- Expand State and Federal recycling programs in order to provide increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for use of recycled water.

Proposed Water Use Efficiency Stage 1 Actions

CALFED Agencies will evaluate the following WUE actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WUE Program.

- Expand existing State and Federal agricultural Water Conservation Programs to support on farm and district efforts. Expand State and Federal programs to provide technical and planning assistance to local agencies and districts in support of local and regional conservation and recycling programs (yr 1-7).
- Expand existing State and Federal conservation programs to support urban water purveyor efforts. Expand State and Federal programs to provide technical and planning assistance in support of conservation and recycling programs (yr 1-7).
- Utilize AB 3616 of the Agricultural Water Management Council to evaluate and endorse Agricultural Water Management Plans to implement cost-effective water management practices by agricultural districts. Identify and secure ongoing funding sources for

- Agricultural Water Management Council and its members seeking to actively participate in the development, review, and implementation of these plans (yr 1-7).
- Develop Urban Water Management Plan Certification Process - Select an agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, and implement program (yr 1-3).
 - Implement Urban BMPs Certification Process. Implement a process for certification of water suppliers' compliance with terms of the Urban Memorandum of Understanding (MOU) with respect to BMPs analysis and implementation for urban water conservation. Provide funding support for the California Urban Water Conservation Council (CUWCC) to carry out this function (yr 1-7).
 - Prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED Program governance structure, for a competitive grant/loan incentive program for WUE (yr 1). This will include:
 - Incentives in the agricultural sector that will consider several factors, including: (i) potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUE measures which result in reduced diversions; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the recipient area experiences recurrent water shortages due to regulatory or hydrological restrictions. Many of these factors are included in the Quantifiable Objectives for Agricultural Water Use Efficiency, and as such, the Quantifiable Objectives will be an important component of the agricultural incentive criteria.
 - Incentives in the urban sector will assist in identifying and implementing urban water conservation measures that are supplemental to BMPs in the Urban MOU process and are cost effective from a Statewide perspective.
 - Incentives for water recycling in the urban and agricultural areas.
 - Annual reporting and evaluation mechanisms to gauge effectiveness of the program.
 - Finalize and implement the methodology for Refuge Water Management which was described in the June 1998 "Interagency Coordinated Program for Wetland Water Use Plan, Central Valley, California" (yr 1-3).
 - Research effort to establish appropriate reference conditions for evaluating program progress, and to identify improved methods for WUE (yr 1-7).
 - Assess the need for additional water rights protections. Evaluate the need for additional State regulations or legislation providing protection for water right holders who have implemented WUE measures and subsequently transferred water to other beneficial uses (yr 1-4).

- Water Management. Develop State legislation that requires appropriate measurement of water use for all water users in California (yr 1-3).
- Create a Public Advisory Committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate State, Federal, regional and local efforts for maximum effectiveness of program expenditures (yr 1).

Water Transfer Program

The CALFED Program's Water Transfer Program (WTP) will encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests. CALFED Agencies have legal and regulatory responsibility for review and approval of most water transfers and also have jurisdiction over many of the storage and conveyance facilities required to make water transfers work. These agencies are in a position to improve or facilitate the operations of the water market by adopting policies and implementing programs that will allow transfers to be completed efficiently while protecting the environment. The Strategic Plan for Implementation provides direction and prioritization for implementation of the CALFED Program's Water Transfer Program, and includes the following actions:

Interactive California Water Market Information Web Site

- Develop the On Tap on-line water market information source for California water transfers.

Environmental, Socio-economic, and Water Resource Protection

- Recommend establishment of a California Water Transfers Information Clearinghouse to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to facilitate assessment of potential third party impacts.
- Require additional water transfer analysis regarding direct and indirect impacts. The DWR, Reclamation, and the State Water Resources Control Board (SWRCB) will require transfer proponents to provide analysis of the direct and indirect impacts of a proposed transfer, in addition to CEQA, ESA compliance or other environmental requirements.
- Develop improved tracking protocols to ensure that water transferred to an instream flow can be tracked and then delivered to the intended destination.

- Work with stakeholders and the State Legislature to assist local agencies in development of groundwater management programs to protect groundwater basins in water transfer source areas.

Technical, Operational, and Administrative Rules

- Work to streamline the current water transfer approval processes through development of new tools, clarification of existing policies, refinement of processes and addition of staff and resources.
- Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions.
- Work with stakeholder representatives to resolve conflicts over carriage water criteria.
- Work with stakeholder representatives to develop criteria that protect other legal users of water from injury as a result of refill of a reservoir after the transfer of stored water.

Wheeling and Access to State/Federal Facilities

- Improve forecasting tools and more widely disclose potential pumping and conveyance capacity in project facilities, including limiting factors and inherent risks.
- Work with stakeholder representatives to consider modification of policies and procedures for transporting non-project water through existing project water conveyance facilities.
- Work with stakeholder representatives to develop cost criteria associated with transporting transferred water through State or Federal conveyance facilities.

Proposed Water Transfer Program Stage 1 Actions

CALFED Agencies will evaluate the following actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Water Transfer Program.

- Develop an Interactive Water Transfer Information Web-site. CALFED Agencies will develop, implement, and maintain an interactive, publicly available web-site called On TAP (by the end of year 2000) (yr 1).
- Establish the California Water Transfers Information Clearinghouse to operate and maintain the On Tap web-site, collect and disseminate data and information relating to water transfers and potential transfer impacts, and perform research using historic data to understand water transfer impacts (by year 2001) (yr 1).

- Coordinate with CALFED Agencies to require water transfer applicants to provide additional impact assessment information (yr 1-4).
- Identify, arrange, fund, and carry out a specific number of targeted water transfers for in-stream environmental purposes as part of the ERP, with a goal of using these transfers to evaluate the effectiveness of and make any necessary improvements to the California Water Code Section 1707 procedures and tracking protocols (yr 1-3).
- Establish a groundwater assistance program to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs (yr 1-2).
- Develop a streamlined water transfer approval process including “pre-certification” of certain classes of transfers and expedited environmental review procedures (yr 1-6).
- Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions (yr 1-3).
- Continue to work with stakeholder representatives to resolve conflicts over carriage water criteria (yr 1-3).
- Establish a refill criteria policy for reservoir storage based water transfers (yr 1).
- Begin forecast and disclosure processes of potential conveyance capacity in existing export facilities (Reclamation and DWR). This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1-7).
- Work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).

Watershed Program

The Watershed Program will use a comprehensive, integrated, basin-wide approach with a goal to improve conditions in the Bay-Delta system. This Watershed Program will emphasize local participation and provide financial and technical assistance for local watershed stewardship, and promote coordination and collaboration among watershed efforts.

The geographic scope of the Watershed Program encompasses the entire scope of the CALFED Program. The Watershed Program will support activities that provide benefits to the Delta, Suisun Bay, and Suisun Marsh.

The Watershed Program covers a broad geographic range and currently lacks project-specific measures for evaluation. Individual projects pursued under the Watershed Program will fully evaluate all alternatives during tiered environmental review and will fully analyze and address

effects under section 7 or section 10 of the ESA. CALFED will ensure that appropriate measures to conserve special status species are included in all program actions.

There are five Watershed Program elements: coordination and assistance; adaptive management and monitoring; education and outreach; integration with other CALFED Program elements; and watershed processes and relationships. These elements, associated proposed programmatic actions, and an implementation strategy are described in the Watershed Program Plan.

The primary objectives of the Watershed Program are:

- Facilitate and improve coordination, collaboration, and assistance among government agencies, other organizations, and local watershed groups.
- Develop watershed monitoring and assessment protocols.
- Support education and outreach.
- Integrate the Watershed Program with other CALFED Program elements.
- Define the relationship between watershed processes and the goals and objectives of the CALFED Program.
- Implement a strategy that will ensure support and long term sustainability of local watershed activities.

Watershed activities will be supported that:

- are community based
- are collaborative and are consistent with the CALFED Program
- address multiple watershed issues
- are coordinated with and supported at multiple levels
- provide ongoing implementation
- include monitoring protocols
- increase learning and awareness.

Proposed Watershed Program Stage 1 Actions

The CALFED Program will evaluate the following Watershed Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Watershed Program Plan.

- Fund and implement community based watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Program (yr 1-7).
- Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation among government agencies and stakeholder groups (yr 1-7).
- Implement a funding process and provide watershed stewardship funds to build the capacity of locally controlled watershed groups that ensure participation of local landowner groups (yr 1-7).
- Improve the use and usefulness of existing or future watershed information management functions to provide data and other information to people involved in watershed management (yr 3-7).
- Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (yr 1-7).
- Evaluate the benefits that accrue from watershed plans and projects designed to achieve CALFED Program goals and objectives (yr 3-7).
- Establish, fund, and maintain watershed restoration and maintenance assistance to aid local watershed groups and private landowners in project concept, design, and implementation (yr 1-7).
- Collaborate with other CALFED Program and non-CALFED Program elements on watershed related activities (yr 1-7).
- Provide appropriate information and assistance to stakeholders and the State Legislature to develop a Statewide umbrella Watershed Management Act (yr 1).

Water Management Strategy

The Water Management Strategy (WMS) describes a framework to coordinate and integrate the water management tools in the program, evaluate the success of implementation efforts, and select additional tools needed to achieve the CALFED Program's water reliability objectives. The CALFED Program has identified three primary goals for the WMS: increase the utility of available water supplies (making water suitable for more uses and reuses); improve access to existing or new water supplies in an economically efficient manner, for environmental, urban and agricultural beneficial uses; and, improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses and decrease system vulnerability.

The tools that will be used to achieve the goals and objectives of the WMS include: the WUE Program (agricultural, urban, and wetland water conservation and water recycling); the Water

Transfer Program; Conveyance, including South Delta Improvements; Storage; and, operational strategies, such as real-time diversion management and an EWA. In addition to these primary tools, the WMS will rely on additional CALFED Program tools to provide additional benefits. These include the Watershed Program, the Water Quality Program, and real-time monitoring through the Science Program.

Storage

The CALFED Program has initiated the Integrated Storage Investigation (ISI) to provide a comprehensive assessment of alternative surface and groundwater storage options and their utility to overall water management.

Decisions to implement new or expanded surface and groundwater storage will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual storage projects pursued under the WMS will fully evaluate project-level alternatives that are consistent with the decision documents in conformance with the legal requirements of section 404, as implemented under the Memorandum of Understanding for section 404 of the Clean Water Act for the CALFED Program. The level of analysis required for specific storage projects will depend upon the programs and related commitments of the CALFED Program, including those related to water use efficiency, water transfers, and the ERP, being implemented. Direct and indirect effects, as appropriate, will be addressed under section 7 or section 10 of the ESA.

Site-specific studies of storage opportunities will be coordinated under the ISI. Specifically, the ISI will evaluate surface storage, groundwater storage, power facility re-operation, and removal of barriers to fish passage and, where appropriate, the potential for conjunctive operation of these different types of storage. These investigations will contribute to compliance with the requirements, within the Clean Water Act Section 404 Guidelines, and pursuant to the EPA and Corps Memorandum of Understanding.

The range of total new storage evaluated in Phase II was from zero up to about six Million acre-feet (MAF). Maximum Sacramento River off-stream or enlarged on-stream surface storage potential is estimated to be about three MAF of storage, while south of Delta off-aqueduct surface storage potential is estimated to be about two MAF of storage. Other types of surface storage considered in Phase II include San Joaquin River tributary storage and in-Delta storage. The CALFED Program will evaluate the feasibility of expanding two existing reservoirs and constructing a new off-stream reservoir with a total capacity of 950 thousand-acre-feet (TAF); and a major expansion of groundwater storage for an additional 500 TAF to one MAF. In

addition, the CALFED Program will study two potential reservoir locations through partnerships with local agencies.

The CALFED Program will continue to evaluate surface and groundwater storage opportunities; initiate permitting, NEPA and CEQA documentation; and proceed with construction, only if all conditions are satisfied. In addition, the CALFED Program will continue to refine and periodically update the WMS. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability, and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Evaluation Framework will include: 1) a comprehensive hierarchy of objectives for the CALFED Program; 2) well-defined measures of performance associated with the achievement of objectives; and 3) a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the WMS and determining appropriate levels of the future investment in various water management tools.

Proposed Stage 1 Storage Actions

The CALFED Program will evaluate the following Storage actions proposed for implementation during Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Storage Program. It is expected that each will require project-specific consultation under section 7 or a permit under section 10 of the ESA.

Groundwater Banking and Conjunctive Use The goal is to develop locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to one MAF of additional storage. This effort includes developing partnerships with local agencies and landowners in both the north-of-Delta and south-of-Delta areas, and includes the potential construction of several south-of-Delta projects. Additional south-of-Delta and north-of-Delta projects, if feasible, could be constructed in later stages.

- Finalize agreements with new local project proponents for joint planning and development (yr 1).
- Begin feasibility studies (yr 1).
- Report on the performance of feasibility studies, implemented projects, and potential benefits and beneficiaries (yr 3).
- Implement early stages of the most promising projects (yr 1-5).

- Pursue implementation of additional projects (yr 1-7).
- Support legislation that supports groundwater management by local agencies at the sub-basin level.

Surface Storage CALFED Agencies identified a list of twelve potential surface storage projects that are in varying stages of the environmental review or feasibility process. Actions taken in Stage 1 will focus on completing the necessary studies (technical work and environmental reviews) needed before implementing or proceeding with the six surface storage projects:

- In-Delta storage project (approximately 250 TAF). CALFED will evaluate leasing or purchasing the Delta Wetlands project, and will evaluate initiating a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible (Planning: yr 1-2, Construction: yr 3-7).
- Evaluate expanding CVP storage in Shasta Lake by approximately 300 TAF by raising the Shasta Dam by three to six feet (Planning: yr 1-4, Construction yr 6-7).
- Evaluate expanding Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros Reservoir is subject to a number of mandates, agreements, and requirements in existing biological opinions. CALFED intends to work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are maintained (yr 1-7).
- Evaluate off-stream storage at Sites Reservoir, with a project capacity of up to 1.9 MAF (yr 1-5).
- Evaluate additional storage options in the upper San Joaquin River watershed. Consider additional storage capacity of between 250-700 TAF (yr 1-6).
- Evaluate enlarging Millerton Lake at Friant Dam or a functionally equivalent storage program in the region. The CALFED Program will join local partners to evaluate this project in Stage 1 (yr 1-6).

Power Facilities Re-operation Evaluation Evaluate the potential to re-operate some hydroelectric facilities to produce ecosystem benefits and water supply. The following ISI actions may be taken:

- Identify beneficiaries and negotiate cost sharing agreements (yr 1-7).
- Work with CALFED Agencies, the Public Utilities Commission, the SWRCB, the Federal Energy Regulatory Commission, and interested stakeholders to identify re-operation opportunities (yr 1-2).

- Develop environmental documentation on re-operation (yr 3-5).
- Perform feasibility studies and economic analyses (yr 3-5).
- Obtain permits, negotiate operating agreements, and seek site specific authorization including section 7 authorization. This may require design of facilities modifications to accommodate new operational priorities (yr 5-7).

Fish Migration Barrier Removal Evaluations To compliment ERP efforts to improve fish passage, the ISI Fish Migration Barrier Removal Program will identify obstructions, such as small dams, and consider modification or removal in order to restore anadromous fish access to critical upstream spawning and rearing habitat. The following actions will be taken:

- Work with CALFED Agencies, the SWRCB, local water agencies, and interested stakeholders to identify opportunities for modification or removal of obstructions such as small dams (yr 1-2).
- Develop environmental documentation (yr 3-5).
- Perform feasibility studies and economic analyses (yr 3-5).
- Obtain permits, negotiate agreements, and seek site specific authorization as required. This may require design on facilities modifications or removal actions. (yr 5-7).
- Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
- Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Conveyance

The CALFED Program will evaluate a through-Delta approach to conveyance based upon the existing Delta configuration with some modifications. The CALFED Program will evaluate the effectiveness of this conveyance approach, and add additional conveyance and/or other water management actions if necessary. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach to meet CALFED Program goals and objectives, consistent with the CALFED Program's Solution Principles. In the event of a finding that a through-Delta conveyance system is inadequate to achieve CALFED Program goals and objectives, additional actions may be implemented. The CALFED Program may also evaluate and pursue: 1) an isolated conveyance facility (a canal connecting the Sacramento River in the northern Delta to the SWP and CVP export facilities in the southern Delta); 2) source water blending or substitution; and/or 3) other actions through supplemental programmatic analysis.

As part of the Conveyance Program, the CALFED Program has incorporated the south Delta and north Delta regions to address conveyance improvements and related problems in Stage 1. Conveyance improvements for the South Delta set forth in the Final Programmatic EIR/EIS are identified as allowing SWP export capacity to increase from the current authorized levels with seasonal increases, as authorized in Corps Permit PN5820A. The proposed increases would allow up to 8,500 cfs pumping in 2003 and ultimately up to 10,300 cfs at the end of Stage 1. The EIR/EIS identifies a number of measures that will be part of the conveyance modifications including new fish screens, ecosystem restoration as part of the ERP, permanent operable barriers or their functional equivalent in selected South Delta channels, and other measures.

Improvements in export capabilities will be accompanied by associated operations which will maintain diversion capabilities for south Delta water users and provide for fish protection. CALFED implementing documents set forth a schedule for securing appropriate regulatory permits and completing a project-specific operations plan that addresses the potential impacts of increased pumping. This plan will need to reflect the nature and timing of the construction and operation of new project facilities and implementation of ecosystem improvements, and a more specific project description following completion of additional planning and environmental studies.

Decisions to implement conveyance actions will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual conveyance projects pursued under the WMS will fully evaluate all alternatives during tiered environmental review and will fully analyze and address direct and indirect effects under section 7 or section 10 of the ESA. Operational rules and facilities needed for use of additional export capability will be determined during ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements.

Proposed Conveyance Stage 1 Actions (South Delta)

The CALFED Program will evaluate the following Conveyance actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Conveyance Program.

- Pursue construction and evaluation of a 500 cfs test facility at the Tracy Pumping Plant to develop best available fish screening and salvage technology for the intakes to the SWP and CVP export facilities (yr 1-7).
- Pursue authorization for construction of a new screened intake for Clifton Court Forebay for the full export capacity of the SWP (yr 1-7).

- Implement the Joint Point of Diversion for the SWP and CVP (yr 1-7).
- Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. An intertie between Clifton Court Forebay and the Tracy Pumping Plant will be required if the export location is consolidated at Clifton Court Forebay and will be evaluated if exports continue at both locations. Also, evaluate and potentially implement an intertie between the projects downstream of the export pumps (yr 1-7).
- Evaluate increased SWP pumping by 500 cfs from July through September (yr 1-4).
- Facilitate interim SWP export flexibility up to 8,500 cfs, with appropriate environmental constraints including ESA requirements (yr 4).
- Obtain permits including ESA authorization to use full SWP capacity of 10,300 cfs, consistent with all applicable operational constraints, for water supply and environmental benefits (yr 7).
- For purposes of the project level environmental analysis for the South Delta Improvements, evaluate various operable barrier configuration alternatives or their functional equivalents. All barrier operations will be done in conjunction with water operations to avoid impacts to fish. Potential barriers include the installation of a permanent fish migration barrier at the Head of Old River, and the construction of three permanent flow control structures at Old River at Tracy, Middle River upstream of Victoria Canal, and at Grant Line Canal. The Grant Line Canal barrier would be constructed and operated in accordance with conditions and directions specified by the Service, CDFG, and NMFS. (yr 1-7).
- Monitor barrier effects on fish, stages, circulation, and water quality (yr 1-7).
- Evaluate the dredging of selected channel segments (yr 3-7).

Additional Actions Required During Stage 1 (South Delta)

- Implement south Delta ERP goals (yr 1-7).
- Consolidate, extend, and screen local agricultural diversions based on priority and initiate a screen maintenance program (yr 1-7).
- Develop a strategy to resolve regional water quality problems including actions to improve San Joaquin River DO conditions and the San Joaquin River drainage as described in the CALFED Program's Water Quality Program. Evaluate the feasibility of re-circulation of water pumped from the Delta by the CVP and SWP. If feasible, and consistent with the CALFED Program's ecosystem restoration goals and objectives, implement a pilot program (yr 1-7).
- Continue implementation of the Vernalis Adaptive Management Plan. Include development of a long-term plan describing actions of the San Joaquin River Group Authority to improve water management practices (yr 1-7).

Proposed North Delta Stage 1 Actions

- Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns (yr 1-4).
- Evaluate a screened through-Delta facility with a diversion capacity of up to 4,000 cfs on the Sacramento River to improve drinking water quality in the event the Water Quality Program measures do not result in continuous improvement towards CALFED drinking water goals. This evaluation would consider the effectiveness of water quality measures and how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery. If the environmental review demonstrates that this diversion facility is needed to address drinking water quality concerns, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction may begin late in Stage 1 subject to section 7 authorization (yr 1-4).
- Evaluate opportunities to resolve local flood concerns and create tidal wetlands and riparian habitat by constructing new setback levees, improving existing levees, and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system. Any proposed channel modifications would be consistent with the CALFED Program's current direction on Delta conveyance and ecosystem goals (yr 1-7).
- Facilitate regionwide coordination of all CALFED Program related projects in the north Delta region (yr 1-7).

Proposed Stage 1 Actions Throughout the Delta Region

- Evaluate how water supplies can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and three parts per million (ppm) TOC (yr 1-7). This will include an equivalent level of investigation and studies on all of the actions which could be used to achieve the CALFED Program's targets.
- Evaluate the CALFED Program's progress toward measurable water quality goals and ecosystem restoration objectives, with particular emphasis on fish recovery (yr 6-7).
- Conduct additional environmental review to determine if construction of an isolated conveyance facility component of a dual Delta conveyance (presently not an element of the CALFED Program's Preferred Program Alternative) is warranted. A decision to construct such a facility would require separate environmental review and alternatives analysis that has not been done as part of the CALFED Program's programmatic analysis (yr 1-7).

Additional Actions Required During Stage 1 (Throughout the Delta Region)

- Fully implement actions, consistent with the MSCS, that mitigate for the direct and indirect environmental affects of project features and actions (yr 1-7).
- Improve flood control through levee improvements, levee setbacks, channel dredging, and floodplain restoration to be fully consistent with regional ERP actions (yr 1-7).
- Screen agricultural intakes to assure ecosystem protection (yr 1-7).

Environmental Water Account

An essential goal of the CALFED Program is to provide increased water supply reliability to water users while at the same time assuring the availability of sufficient water to meet fish protection and restoration\recovery needs as one part of the overall ERP. As a means to achieve these objectives, the CALFED Program will provide commitments under the ESA and CESA to SWP and CVP export facilities only for the first four years of Stage 1. These commitments are based on fully providing water from existing regulatory means, a fully implemented EWA, flows and habitat restoration provided through the ERP, and the ability to obtain additional assets should they be necessary.

The EWA is a new water source provided to: (1) augment instream flows and Delta outflows; and (2) reduce Delta exports from CVP/SWP export facilities during key periods of fish and aquatic ecosystem concerns. The CALFED Agencies will also continue to work with other diverters in the Delta watershed to resolve local fishery-diversion conflicts based on the site-specific needs and opportunities for each diversion. The CALFED Agencies have crafted the EWA so that it has no effect on the existing water rights of other water right holders in the watershed.

Overall Purpose, Framework and Administration. The EWA will be established, as part of the EWA Operating Principles Agreement (see Appendix E, hereby incorporated as part of this project description), to provide water for the protection and recovery of fish in addition to water available through existing regulatory actions related to project operations. The EWA Operating Principles Agreement will be interpreted to be consistent with this project description. To the extent that the EWA Operating Principles Agreement provides greater specificity, the EWA Operating Principles Agreement will be the controlling document.

The EWA will be funded jointly by the State and Federal governments and will be authorized to acquire, bank, transfer and borrow water and arrange for its conveyance. EWA assets will be managed by the State and Federal fishery agencies (the Service, NMFS, and CDFG) in

coordination with project operators and stakeholders. Initial acquisition of assets for the EWA will be made by Federal and State agencies (Reclamation and DWR). Subsequently, it is anticipated that acquisitions may be made pursuant to a public process that may take advantage of other agencies or third parties to acquire assets.

Baseline Level of Protection. DWR and Interior will provide a baseline of environmental protection. The CALFED Agencies recognize that the SWRCB may adjust the CVP and SWP responsibilities for complying with the 1995 Delta Water Quality Control Plan (WQCP), as part of its on-going Bay-Delta Water Rights Hearings. The outcome of those hearings may affect the nature of this baseline. The CVP's and SWP's regulatory baseline, primarily for fish needs, identified as Tier 1 in the EWA discussion below, will include:

- **1993 Winter-run Salmon Biological Opinion (NMFS)**
- **1995 Delta Water Quality Control Plan (SWRCB)**
At this time, the SWP and CVP are responsible for meeting flow related objectives contained in this plan. The CALFED Agencies recognize that the SWRCB may adjust or re-allocate the responsibilities for meeting the 1995 Delta Water Quality Control Plan, as part of its ongoing Bay-Delta Water Rights hearings. Adjustment of responsibility to meet the standards will not affect the baseline level of protection for purposes of the EWA.

The appropriate CALFED Agencies will develop a strategy to deal with the rare circumstances when the CVP obligation under the WQCP exceeds the 450 TAF annual cap for use of CVPIA Section 3406(b)(2) water. In the strategy, to be developed in conjunction with part of the Governor's Drought Contingency Plan, the Agencies will use their available resources to create an insurance policy to eliminate impacts to water users, while not adversely affecting other uses.

- **1995 Delta Smelt Biological Opinion (Service)**
The export curtailment contained in the 1995 Delta Smelt Biological Opinion (item 2 on page 19), commonly referred to as the "2 to 1 Vernalis flow/export ratio", will be met by Section 3406(b)(2) of the CVPIA and EWA. This objective calls for the SWP and CVP to reduce combined exports, below what is allowed in the 1995 Water Quality Control Plan during a 31-day period in April and May. The 1995 WQCP allows exports to be 100% of the base San Joaquin River flow at Vernalis during the April-May pulse period. The CVP reduction in pumping will be conducted pursuant to the accounting policy for Section 3406(b)(2) of the CVPIA and/or through reimbursement by the EWA. The SWP

will be reimbursed by the EWA for its participation in reducing exports pursuant to the 2 to 1 Vernalis flow/export ratio.

The CVP and SWP will be operated pursuant to the terms of the San Joaquin River Agreement through 2011. While the SJRA is in effect, the exports may be reduced beyond what is called for by the 2 to 1 Vernalis flow/export ratio and San Joaquin River flows may be augmented by water acquired from upstream sources during that same time period. Such an augmentation will not be included as part of the SWP share of Vernalis flow. While operating per the SJRA, the SWP and CVP will also receive reimbursement from the EWA or pursuant to Section 3406(b)(2) for the additional curtailment. If the SJRA is not implemented for any reason, the operations will default back to the biological opinion operation, as per the terms of the SJRA.

- **Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in Accordance with Interior’s October 5, 1999 Decision, clarified as follows:**

Water Resulting from Refill of Reservoirs (“Reset”): Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases (“reset”) will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the “reset” provision.

Export Curtailments which Result in Increased Storage (“Offset”): Where a prescribed (b)(2) export curtailment results in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to south-of-Delta CVP contractors in the remainder of the water year. If such deliveries cannot be increased in that water year, such additional water stored in upstream reservoirs shall be available for other (b)(2) uses without charge to the (b)(2) account. Where the delivery to export users in the remainder of the water year will not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

The Secretary of the Interior is expected to make a decision later this year on Trinity River flows, pursuant to the original Trinity authorization, the Trinity Restoration Act of 1984, and the CVPIA. The substance of the decision is unknown and therefore cannot be addressed at this time.

Other Environmental Protections The regulatory baseline above also assumes that other environmental protections contained in biological opinions, regulations or statutes remain in place. These protections include, without limitation, Level 2 refuge water supplies, as required by the CVPIA. The CVP will use its share of the benefits from joint point of diversion, to the extent available, to provide water required by its Level 2 refuge water supply mandates, but using such benefits will not create any limitation on the Level 2 supply available for refuges.

Operational Rules The ground rules for operating the EWA are detailed in the EWA Operating Principles Agreement, executed by DWR, Reclamation, CDFG, the Service, and NMFS. The ground rules are based on the principle that the EWA will provide flows allowing fish recovery while not resulting in uncompensated reductions in deliveries to south of Delta CVP/SWP contractors.

Asset Development Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in a following table, an initial one-time acquisition of 200 TAF of south-of-Delta storage or its functional equivalent will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries. This initial deposit will also provide collateral for the first year's borrowing. The related storage is intended to function as long-term storage for other EWA assets as they become available.

Borrowing agreements will allow the EWA to borrow water from the CVP and SWP for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be shared. The limitations on borrowing will be developed as part of the agreement. Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries will not be affected by EWA operations. To provide regulatory stability during the initial period of Stage 1, the CALFED Agencies will provide a commitment, subject to legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP Delta exports resulting from measures to protect fish under the ESA and CESA. This commitment will be based on the availability of three tiers of assets:

Tier 1 is baseline water, provided by existing regulation and operational flexibility. The regulatory baseline consists of the biological opinions on winter-run salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP yield pursuant to CVPIA Section 3406(b)(2).

Tier 2 consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish over and above Tier 1, when needed without reducing deliveries to water users. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets as described subsequently.

Tier 3 is based upon the commitment and ability of the CALFED Agencies to make additional water available should it be needed. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, Tier 3 will be provided. In considering the need for Tier 3 assets, the fishery agencies will consider the views of an independent science panel. Although the CALFED Agencies do not anticipate needing access to Tier 3 water assets, the CALFED Agencies will prepare an implementation strategy for Tier 3 by August 2001, establish a timely scientific panel process, and identifying tools and funding should implementation of Tier 3 prove necessary.

Table 2. List of EWA assets. Some assets may be replaced by functional equivalents, if determined to be appropriate by the EWA Managing Agencies (Service, CDFG, NMFS)

Action Description	Water Available Annually(Average)
SWP Pumping of (b)(2)/ERP Upstream Releases¹	40,000 acre-feet ²
EWA Use of Joint Point³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta⁴	35,000 acre-feet
TOTAL	380,000 acre-feet
Storage acquisition	200,000 acre-feet of storage, filled when acquired in Year 1
Source-shifting agreement	100,000 acre-feet at any time

¹The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

²The amount of water derived from the first four actions will vary based on hydrologic conditions.

³The EWA will share access to joint point, with the CVP receiving 50% of the benefits.

⁴This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

CALFED Science Program

The CALFED Science Program includes implementing the Comprehensive Monitoring, Assessment, and Research Program (CMARP) as an integral aspect of the overall CALFED Program. The scope of the Science Program will encompass all elements of the CALFED Program: ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and levees integrity. The purpose of the Science Program is to provide new information and scientific interpretations necessary to implement, monitor, and evaluate the

success of the CALFED Program. The Science Program will build on the work of the Interagency Ecological Program and other scientific efforts in the CALFED Program area.

The CALFED Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions, the effects of human stressors on ecosystem structure and function, and the ecological and other effects of individual CALFED Program actions. Monitoring key system functions (or indicators), completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process.

In order to better integrate scientific review into the CALFED Program, the Governor and the Secretary of the Interior will appoint an independent science board to provide oversight and peer review for the overall program. Also, specific independent science panels may be convened as standing bodies or on an as needed basis. For example, the Science Program will assist with convening an independent science panel to review implementation and operation of the EWA. In addition, the existing ERP Interim Science Board will likely become the ERP Science Panel, and provide ongoing independent review of the ERP.

Proposed Science Program Stage 1 Actions

The CALFED Program will evaluate the following Science Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions for the Science Program.

- Periodic review and refinement of the monitoring, data assessment and research plan from a long term perspective (yr 1-7).
- Periodic review and refinement of the monitoring, data assessment and research plan from a short term perspective which would include all elements of the Phase III, Stage 1 Program (yr 1-7).
- Help management define triggers and time periods which determine the need for a change in program direction (yr 1-7).
- Continue to develop and refine conceptual models to be used in evaluating actions undertaken by the programs. In keeping with the adaptive management format, the models will be continually updated with information generated by program actions (yr 1-7).
- Evaluate the effectiveness of the adaptive management process on the program decision making process (yr 1-7).

- Review the progress toward achieving overall CALFED Program goals and objectives and whether individual programs are progressing at similar paces (yr 1-7).
- Complete monitoring identified by the Diversion Effects on Fisheries Team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7).
- Design long-term, system wide, baseline monitoring with focused research to increase understanding of ecological processes and ways to reduce uncertainty; definition of needed studies is currently under development (yr 1-7).
- Provide available data on need to reduce bromides, total dissolved solids, total organic carbon, pesticides and heavy metals (yr 5).
- Provide available data on water quality in the south Delta and lower San Joaquin River (yr 1-7).
- Monitor and assess the impacts of water use efficiency measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).
- Prepare annual reports on status and progress, including such information as: status of the species and effectiveness of efforts to improve conditions, including EWA, ERP and water management strategies, and provide recommendations to maximize fishery benefits while minimizing impacts to water supply (yr 1-7).
- Analyze status and need for adjustments of actions for later stages (yr 5-7).
- Monitor and report land use changes, such as agricultural land conversion, resulting from CALFED Program actions (yr 2-7).
- Hire an interim science leader and subsequently hire a chief scientist (yr 1-2).
- Appoint an Independent Science Board and an independent science panel for the EWA (yr 1-2).
- Coordinate existing monitoring and scientific research programs (yr 1-7).
- Refine the set of ecological, operational, and other predictive models that will be used in the evaluation process (yr 1-2).
- Establish and refine performance measures and indicators for each of the program areas (yr 1-7).

Multi-Species Conservation Strategy

The MSCS serves as a biological assessment for the CALFED Program and describes the CALFED Program strategy for achieving compliance with the ESA, CESA, and Natural Community Conservation Planning Act during implementation of the CALFED Program. As a biological assessment, it summarizes the CALFED Program and analyzes its effects on 244 listed, proposed, and candidate species, and species of concern. As a “conservation strategy” it outlines

conservation goals for species that will be effected by the Program, and identifies strategies for achieving those goals and ESA compliance.

Conservation Goals and Prescriptions

The MSCS identifies conservation goals for 244 species as well as species prescriptions and conservation measures to achieve these goals. The CALFED Program has established a goal to recover 19 species, contribute to the recovery of 25 species, and maintain 200 species. A goal of “recovery” was established for those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh systems. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species long-term survival in nature is assured. Recovery is equivalent, at minimum, to the requirements for de-listing a species under ESA and CESA. The goal “contribute to recovery” was assigned to species for which CALFED Program actions affect only a limited portion of the species’ range and/or CALFED Program actions have limited effects on the species. To achieve the goal of contributing to a species’ recovery, the CALFED Agencies are expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. The goal “maintain” was assigned to species expected to be minimally affected by CALFED Program actions. For this category, the CALFED Agencies will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species. Actions may not actually contribute to the recovery of the “maintain” species; however, at a minimum, they will be expected to not contribute to the need to list a species or degrade the status of a listed species. The CALFED Agencies will also, to the extent practicable, improve habitat conditions for these species.

Specific prescriptions were developed to achieve the conservation goals described above for each species. The prescriptions incorporate the measures identified in State and Federal recovery plans, where available, other relevant information, and professional judgment. Prescriptions include measures to enhance habitats and species and are not directly linked to the CALFED Program’s adverse impacts.

As the CALFED Program proceeds during the next 30 years, it is anticipated that California’s landscapes could change significantly and that new information will be available through research and monitoring. Consequently, species goals and prescriptions will likely change through time through adaptive management, and as new recovery plans are finalized or updated.

Framework for Federal Endangered Species Act Compliance

The CALFED Agencies will take actions necessary to meet the following conditions: 1) the fishery protections elements of the Program must be implemented as described in the EIS/EIR, including the ERP and EWA implementation and funding commitments (at least \$150 million annually for the ERP, and an additional \$50 million annually for the EWA); 2) Tier 3 measures must be provided, if and when needed; and, 3) implementation of the milestones must be demonstrated; and 4) the initial and annual assets of the EWA must be acquired for the EWA.

The program will be continuously monitored to ensure that it is implemented as intended and the elements necessary for regulatory commitments, i.e., conditions as described in the Conservation Agreement are implemented. In the event that information from monitoring or any other source indicates that any of the Program elements necessary for regulatory commitments are not being met or will not be met, notification will be provided, by the agency which developed the information, to the affected Agencies, as appropriate. Upon notification, the affected agencies will meet promptly to identify and assess measures which can be taken to remedy any noncompliance or anticipated noncompliance with the conditions, and will immediately implement measures. If the Service determines that a situation of noncompliance exists and the affected agencies are unable to remedy noncompliance within a reasonable time period that the Service prescribes, not to exceed 60 days, the regulatory commitments will be suspended or terminated. Upon a determination of noncompliance, formal consultation will be reinitiated and the Service will issue a new or amended biological opinion with conditions prescribing alternative regulatory requirements. If the compliance with the conditions set out above is subsequently achieved, the initial regulatory commitments may be revised and reflected through new or amended programmatic biological opinions. Nothing described here will affect the Service from exercising our regulatory authority.

There are several issues that have been subject to interpretation in the 1995 delta smelt opinion relating to OCAP. These issues will need to be resolved pursuant to any reinitiation of section 7 consultation concerning the joint operations of the CVP and SWP should the EWA not be fully implemented. These issues include but may not be limited to 1) the amount of allowable exports during the San Joaquin River pulse flow in April-May, either under the VAMP or the WQCP Vernalis flow requirements, 2) the amount or extent of actions that must be taken at the “yellow light” stage of incidental take to avoid or minimize the direct and indirect effects of project operations and to avoid reaching “red light”, and 3) other actions that may be deemed necessary at the time of reinitiation to provide the regulatory protection for delta smelt, Sacramento splittail, spring run chinook salmon, and steelhead.

The MSCS describes program-level strategies to achieve compliance with ESA, including strategies to address the indirect effects of actions taken under the CALFED Program, and strategies for completing tiered consultations, when appropriate. The CALFED Program's compliance strategies will, in part, be developed and implemented as part of future CALFED Program projects tiered from this programmatic biological opinion.

Entities implementing CALFED Program actions which may effect listed species will be required to develop ASIPs. ASIPs will be developed for individual CALFED Program actions or groups of actions when enough detailed information is available about the actions to analyze fully their impacts on species and habitats, and develop appropriate measures to avoid, minimize, and compensate for impacts. Specifically, individual projects that qualify for consultation will be evaluated within the context of the program as a whole, which includes major elements designed to improve the environmental baseline and lead to the recovery of targeted species. These major elements will be subject to on-going monitoring, evaluation, and the application of adaptive management. Site specific biological opinions will take into account the environmental benefits that accrue from the CALFED Program.

Development of ASIPs will be coordinated with the wildlife agencies so that the particular set of measures necessary to be implemented to achieve FESA compliance will be incorporated as part of the proposed ASIP. The particular set of measures included will likely be unique to each ASIP. The MSCS describes programmatic avoidance, minimization, and compensation measures to be incorporated into ASIPs. However, ASIPs also may include additional measures not described in the MSCS, and possibly a set of ERP actions. For example, a levee improvement project in the Delta may include a particular set of MSCS avoidance, minimization, and compensation measures, additional measures unique to the proposed project, and ERP actions to restore wildlife habitat adjacent to or on the improved levee. ASIPs will be reviewed for compliance with the ESA through the section 7 consultation process, or through the section 10 habitat conservation planning process.

Service Area Effects

Implementation of the CALFED Program's Preferred Program Alternative related to water supply reliability will be determined largely in an incremental fashion through an adaptive management process. Because of this, it is not possible to accurately estimate the scope of potential service area effects on species and habitats. Project-level or site-specific impacts may not be known until Phase III of the CALFED Program (implementation). Therefore, the CALFED Program strategy for addressing indirect effects in the service areas includes identifying a short-term strategy based

on critical species needs for recovery and restoration, and a long-term strategy for dealing with impacts that cannot be predicted when the biological opinions are issued.

CALFED Agencies will use a two-step process to address potential service area effects that are currently unknown. First, CALFED Agencies will determine the potential presence and scope of any service area effects. Then, to address the effects it has identified, CALFED Agencies will integrate proactive, conservation planning approaches with specific conservation measures. To do this, CALFED Agencies will develop the four conservation measures listed below during Phase III.. These measures, as described in the MSCS on pages 4-17 and 4-18, attempt to address these effects at the project level and at the program level.

- Providing technical assistance and other support to entities preparing Habitat Conservation Plans (HCPs) or conservation programs addressing effects of land use changes in the service areas.
- Evaluating each future water supply reliability program or project during planning and including appropriate measures to address indirect effects in the ASIPs. This may include implementing the applicable conservation measures already in the MSCS to conserve species relative to service area effects or developing new measures.
- Developing or contributing to conservation programs to address the critical needs of species in CALFED Program service areas not already covered by conservation plans.

Governance Plan

The interim governance structure will be in place from the time of the Programmatic ROD until a long-term permanent structure is adopted through State and Federal legislation. For interim governance, CALFED Agencies propose adoption of the current CALFED Program structure being used during the planning stage, but adapted for implementation. The interim governance structure, including identification of how decisions will be made, will be set forth in a new Implementation MOU which the agencies will develop and execute by the time of the ROD. The current structure is made up of the Policy Group reporting to the Governor of California and the Secretary of the Interior, public advisory groups, the CALFED Program Executive Director and staff, and State and Federal agencies and teams. This structure, with additions and modifications, will serve to bridge the gap until a permanent commission is established.

Interim Program Management Responsibilities The Levee System Integrity Program management will remain with DWR, CDFG, and other existing agencies. The CALFED Program will continue to manage the ERP, in coordination with the appropriate agencies. The State and Federal fishery agencies (CDFG, Service, NMFS) will manage the EWA assets, in coordination with the ERP and

water project operations (Reclamation and DWR). CALFED Program will be assigned program management for the Watershed Program. The CALFED Program and appropriate agencies (such as Reclamation, EPA, DHS, DWR, and SWRCB) will manage the Drinking Water Quality Program. For the Water Transfer Program, CALFED Program will provide program direction, oversight, and coordination among CALFED Program areas and among agencies with jurisdiction over water transfers and use of project facilities. Agencies with jurisdiction over water transfers would retain authority to implement any changes in their own policies or procedures. DWR, Reclamation, and CALFED Program will manage the Water Use Efficiency Program. DWR, Reclamation, and CALFED Program will manage the Storage Program Element. DWR and Reclamation will manage the Conveyance Program element. CALFED Program will manage the Science Program (as consistent with the Implementation MOU).

Milestones

Milestones are a list of ERP, MSCS, and Water Quality Program actions the CALFED Program will fully implement in Stage 1 to address covered species. Milestones are a subset of the ERP actions the fish and wildlife agencies expect will be implemented in Stage 1, to achieve the Program's conservation goals. The complete list of milestones appears in Appendix J. A full description of the function and significance of the milestones to this consultation is included in the Appendix.

The Program's objectives for ecosystem restoration are to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse plants and animal species. The ERP, MSCS, and WQP are the principal Program elements designed to meet these objectives. Implementation of the ERP will be informed by the Science Program, which will conduct pertinent research, and monitor and evaluate the implementation of ERP, MSCS, and WQP actions. The ERP, MSCS, WQP, and the Science Program are directly relevant and important for FESA, CESA and NCCPA compliance. To ensure that the ERP, MSCS, and WQP are implemented in a manner and to an extent sufficient to sustain programmatic FESA, CESA and NCCPA compliance for all Program elements, the USFWS, NMFS and CDFG (the Fish and Wildlife Agencies") have developed Milestones for ERP, MSCS, and WQP implementation. The Milestones include Science Program actions that are relevant for ERP, MSCS, and WQP implementation. The Fish and Wildlife Agencies have concluded that the Milestones, if achieved along with expected additional ERP actions, define an adequate manner and level of ERP, MSCS, and WQP implementation for Stage 1.

The ERP, MSCS, and WQP are the Program's blueprint for the restoration of the Bay-Delta. The MSCS is not a separate blueprint or supplemental restoration program and does not supplant the ERP. The measures and goals in the MSCS are consistent with the ERP's measures and goals. However, the MSCS is a conservation strategy and a regulatory compliance strategy for the entire Program. The MSCS addresses the potential adverse effects and beneficial effects of all Program actions, including ERP actions and other Program actions such as levee system integrity actions, water conveyance actions and storage actions. Based in large part on the ERP, the MSCS' premise is that the Program as a whole, including all Program elements, will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The ERP therefore serves two purposes: 1) to achieve Program objectives for ecosystem restoration and species recovery, and 2) to enable actions from all Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

To serve both of these purposes, ERP implementation must be informed both by the best available scientific information and by information about the implementation of other Program actions. Information about the implementation of other Program actions is necessary to ensure that they do not conflict or limit the success of the ERP. In addition, ERP restoration actions must be implemented concurrent, and at a commensurate level, with the implementation of other Program actions to ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The Milestones are intended to establish, based on the best information currently available, a group of actions derived from the ERP, MSCS, and WQP that 1) establish an adequate level of implementation during Stage 1, 2) would not be inhibited by proposed Stage 1 actions in other Program elements, and 3) would enable proposed Stage 1 actions in other Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

The Program's development of annual, near-term, and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, the MSCS, FESA recovery plans, and implementation plans developed for specific ecological management zones, and will be informed by the Science Program. The Milestones represent the MSCS' goals and objectives with respect to the ERP. As with ERP implementation priorities and strategies generally, the Fish and Wildlife Agencies intend that the Science Program will provide information concerning the Milestones. Specifically, the Fish and Wildlife Agencies will seek review within the Science Program of 1) whether other Program elements conflict with implementation priorities and strategies so as to limit the success of the ERP, MSCS, and WQP, and 2) whether the implementation priorities and strategies will ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. As the

Science Program develops information about implementation, the USFWS, NMFS and CDFG will revise the Milestones as necessary, consistent with the FESA and the NCCPA.

The CALFED Program will develop annual ERP implementation plans using the ERP Strategic Plan for Ecosystem Restoration and the MSCS. Members of the Science Program, the Agency/Stakeholder Ecosystem Team (“ASET”) the CALFED Program will work cooperatively to develop annual ERP implementation plans and to define the long-term priorities for the ERP. The Fish and Wildlife Agencies will participate fully in the process for developing annual ERP implementation plans. The Fish and Wildlife Agencies’ participation will include, but not be limited to, participation in the ASET. Through participation in the annual ERP implementation plan process, the Fish and Wildlife Agencies will help ensure 1) that each plan is based on the best available information regarding ecosystem restoration and the Bay-Delta system, 2) that each plan will achieve substantial progress toward meeting the Milestones, and 3) that the Science Program will provide information to achieve applicable Milestones. As new information becomes available and conceptual models are tested and refined as part of this process, the Fish and Wildlife Agencies anticipate that priorities reflected in the Milestones may change, and that new issues or questions may emerge. Through the annual ERP implementation process, Science Program members, the CALFED Program, and ASET members may propose revisions to the Milestones based on pertinent new information. If the Fish and Wildlife Agencies determine that the proposed revisions are warranted and are consistent with FESA and the NCCPA, the Fish and Wildlife Agencies will revise the Milestones accordingly.

The Fish and Wildlife Agencies will not approve revisions to the Milestones that would cause or allow an effect to Covered Species or critical habitat designated under FESA that was not considered in the programmatic regulatory determinations, or would otherwise require the re-initiation of consultation under 50 CFR §402.16. Consequently, the USFWS and NMFS expect that their approved revisions to Milestones can be incorporated in each agency’s programmatic biological opinions without re-initiating consultation under §7 of FESA. CDFG will incorporate its approved revisions to the Milestones by amending the CDFG Approval and Supporting Findings for the MSCS.

It will not be possible to gauge the progress of Milestone implementation for a few years, once Phase III begins. Consequently, over the first four years the Wildlife Agencies will base success of Program Implementation upon the criterion that the ERP is fully funded (at least \$150 million from dedicated funding sources annually through Stage 1 for the ERP, and an additional \$50 million EWA funding annually for the first four years). However, the criterion for success at the end of Stage 1 will be implementation of the Stage 1 Milestones.

The Program will submit an annual report to the Governor, the Secretary of the Interior, the State Legislature and the Congress that describes the status of implementation of all Program elements by December 15 of each calendar year. The report will document the status of all actions taken to meet Program objectives in Stage 1. Among the actions addressed in the report will be the completion of key projects and milestones identified in the ERP. Progress in achieving the ERP-MSCS Milestones will be included in the portion of the annual reports concerning the ERP.

Summary of Key Planned Actions

If key program actions are not implemented at this programmatic level, or new information becomes available, consultation would be reinitiated at the programmatic level to ascertain how the lack of implementation of any actions, or new information, affects the evaluation of effects upon listed species associated with the overall implementation of the suite of actions being considered and the subsequent conclusions made in this biological opinion. The following key actions are considered relevant to this biological opinion and part of the project description and, are therefore, requisite in conducting the effects analysis:

Program-wide

1. The conservation actions described in the Description of the Proposed Action will be implemented, including, but not limited to, the Ecosystem Restoration Program Plan, the Water Quality Program Plan, the Watershed Program Plan, and the Multi-Species Conservation Strategy and, where applicable, its strategy for addressing indirect, service area effects. The determination of whether and to what extent a specific action results in indirect effects will be made on a case-by-case basis in accordance with legal requirements. These actions will be implemented consistent with the Science Program and adaptive management, as described in the **Description of the Proposed Action**.
2. CALFED Agencies will obtain funding sufficient to implement the conservation elements and strategies, as necessary, to implement this biological opinion.
3. The various CALFED Program elements, strategies, and projects will be implemented in concert with the ERP, MSCS, EWA, and WQP to achieve the multiple goals of the CALFED Program. The CALFED program will be implemented such that the net effects to species and their habitats are positive and are consistent and in conformance with State and Federal recovery plans.

4. To the extent that a CALFED action is not subject to section 7 and is likely to result in take of a listed species, a section 10 permit will be required.
5. The CALFED Program will utilize comprehensive monitoring and adaptive management to assess projects and programs.
6. The CALFED Program will implement projects to achieve the milestones (Appendix J) established for the ERP, MSCS, and WQP.
7. Discharges into surface water bodies and waterways resulting from CALFED Program actions will comply with the standards set forth in the Description of the Proposed Action for the biological opinion on the Environmental Protection Agency's Promulgation of Numeric Criteria for Priority Toxic Pollutants for the State of California; California Toxics Rule (CTR) (Service File No. 1-1-98-F-21), in accordance with applicable implementation plans.
8. Entities implementing CALFED Program actions will comply with all applicable environmental laws.
9. DWR, to the extent required by law, and Reclamation will consult on all new and modified water contracts resulting from a CALFED Program action that may affect listed species.

Levee System Integrity Program

10. Levee integrity improvement elements will be consistent with ERP actions and MSCS conservation measures, so that levee integrity and ecosystem and species recovery advance simultaneously.
11. The Service, NMFS, and CDFG will be involved in planning Levee System Integrity Program projects to ensure that ERP implementation is not impaired by levee program actions and adverse effects of levee actions are fully mitigated.
12. Development and implementation of CALFED Program plans for rehabilitating Suisun Marsh levees will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans.
13. Levee repair/improvements will be constructed using levee set-backs and soft-fixes (bio-technical solutions) to the extent practicable.

Water Quality Program

14. The CALFED Program will implement projects to achieve the milestones established for the WQP in Stage 1.

Ecosystem Restoration Program

15. The CALFED Program will implement projects to achieve the milestones established for the ERP in Stage 1.
16. The ERP will be implemented in a manner that will achieve species prescriptions and recovery goals of covered species by year 30 of the CALFED Program. Stage 1 milestones establish the trajectory for achieving recovery goals for the first 7 years.

Water Use Efficiency Program

17. Development and implementation of the WUE will be consistent with the goals and objectives of the ERP and MSCS, including State and Federal recovery plans. Program actions and associated conservation measures will be planned in conjunction with the Service, NMFS, and CDFG, in compliance with FESA, CESA, and NCCPA, as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program).

Water Transfers Program

18. CALFED Program actions subject to the FESA that will result in the transfer of water that may affect listed species will not be undertaken until consultation under section 7 or a permit under section 10 is completed. In any such consultation, the fish and wildlife agencies will determine whether adverse effects are likely to occur. Additionally, the EWA will not be charged for curtailed 3rd party transfer opportunities.
19. EWA, CVP, and Level 4 Refuge water supply transfers resulting from CALFED actions will have priority for conveyance over other transfer obligations (as consistent with the Operating Principles Agreement, for the EWA).

Watershed Program

20. Development and implementation of the Watershed Program will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans. Program actions will be planned in conjunction with the Service, NMFS, and CDFG, in compliance with FESA, CESA, and NCCPA, as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program). Program actions will be funded so that it is assured that appropriate conservation measures for listed species will be included in program actions, as appropriate.

Water Management Strategy

Specific key actions are provided for storage, conveyance, EWA, and other programs.

Storage

21. Storage sites will be selected through a screening process which includes applicable environmental requirements.
22. Following the initiation of consultation, CALFED Agencies will comply with section 7(d) of the ESA, which prohibits making any irreversible or irretrievable commitment of resources, for any potential new storage site or modified storage site prior to achieving project-specific compliance under section 7(a)(2) of the ESA.
23. Tiered project specific analyses of potential storage improvements will identify and result in the selection of alternatives that are capable of being mitigated with appropriate mitigation sites and operational requirements; where the compensatory mitigation is highly likely to be successful; with the project specific compensatory mitigation implemented concurrent with, or in advance of, the adverse effects associated with construction and implementation of the project; where construction and operation of the project will not result in jeopardy to listed or proposed species or adverse modification of critical habitat; and where the project will not result in substantial degradation of the aquatic environment.
24. Any and all conveyance structures (e.g., canals, pipelines), recreation, roads, and similar developments associated with or proposed in conjunction with proposed expansions of existing storage facilities or proposed new storage facilities will be evaluated thoroughly for their impacts to Federal or State listed species and those species evaluated consistent with the MSCS. If, through the informal or formal consultation process, it is determined by the Service, NMFS, and CDFG (for State listed species) that project-related impacts would threaten the long-term viability of Federal or State listed species or those species

evaluated under the MSCS, the proposed project(s) will be modified or dropped from consideration.

Conveyance

25. To the extent consistent with the Service's regulatory authority, any CALFED Agency that proposes to develop water for delivery or application outside current contract service areas would comply with ESA requirements under section 7 or 10, as appropriate, if listed species may be affected.
26. In proceeding with the South Delta Improvement Program, CALFED Agencies shall implement ecosystem restoration in the lower San Joaquin river and south Delta (generally, south of Empire Cut) in advance of or concurrent with impacts resulting from south Delta facility improvements.
27. When the CDFG, NMFS and Service, in consultation with the CALFED Agencies, determine that a diversion requires screening, CALFED Agencies will secure written agreements from willing land owners to allow access for screening of agricultural and municipal diversions to protect fish consistent with the screening priorities established by the CALFED Program. The agreement will provide that if monitoring is necessary, access for monitoring will be allowed with reasonable notification. If the CALFED Program is not substantially achieving screening program objectives, the CALFED Agencies will reinitiate informal or formal consultation.
28. When implementing EWA export reductions, the water cost associated with decreased exports will be charged against current facilities capabilities as constrained by current regulation. Any future increases in exports resulting from CALFED conveyance improvements will have operational rules developed through consultation with the fish and wildlife agencies to ensure consistency with EWA Operating Principles, and the goals of restoration and recovery for aquatic species.
29. In the interim, prior to installation of permanent operable barriers, DWR will apply for and obtain permits to allow the continued operation of the temporary barriers.
30. Prior to increasing pumping above current authorized levels, operational rules for use of additional export capability will be determined through an open CALFED process and ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements. To offset potential impacts and to provide for recovery of

fishery populations, additional measures will be developed which would allow for protection of fish. These additional measures, which are phased over time, may include, but are not limited to (a) screening, (b) new standards which limit the timing and magnitude of exports and water supply releases at key periods of fish concern, or (c) a combination of the two. ESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this opinion.

31. An isolated conveyance facility will be evaluated as an alternative in the event it is determined that a through-Delta system will not accomplish the CALFED Programs' goals for restoration and recovery of listed species, or its WQP goals. The study will be developed through a peer-review process to ensure objective analysis.

EWA

32. All EWA fixed assets (i.e., purchases) are acquired each year.
33. The EWA Operational Principles Agreement is signed and fully implemented.
34. The project agencies shall request clarification with the Service, CDFG and NMFS on any points that appear to be ambiguous related to fishery actions for the EWA.
35. If EWA assets are depleted and the Service, NMFS, and CDFG determine Tier 3 is necessary, Tier 3 assets will be available to protect fish.
36. As new water storage and conveyance projects are being planned, potential fishery impacts will be assessed. If necessary to offset potential impacts and to provide for recovery of fishery populations, operational rules will be developed which will provide for protection of fish. These operational rules may include but are not limited to (a) limits on the timing and magnitude of exports and water supply releases at key periods of fish concern, and (b) new sharing formulae to increase EWA assets, which would allow the EWA to offset impacts and implement restoration actions. ESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this opinion, as appropriate.

Science Program

37. The Science Program will complete annual reports describing program progress and compliance of all CALFED program actions within this biological opinion.

Multi-Species Conservation Strategy

38. CALFED agencies will consult with the Service or request technical assistance, as appropriate, to determine whether any future CALFED Program actions (including water transfers and permanent assignment of water) may affect listed or proposed species before signing a ROD or a FONSI which is tiered from the PEIS. This determination will consider both direct and indirect effects, if any, of specific actions. Evaluation of whether and to what extent the specific action results in indirect effects will be made on a case by case basis in accordance with legal requirements.
39. The list of evaluated species will be reviewed and revised periodically by the Service, NMFS, and CDFG to add and remove species, as appropriate, and to review the recovery objective (R, r, or m) for species for their appropriateness.
40. The Service will work closely with other CALFED agencies, water users and others, providing them with maps of listed species habitats within service areas. The Service will guide entities through the consultation process or provide technical assistance, as appropriate, to address project-specific effects.
41. Entities implementing CALFED Program actions will complete tiered, project-specific consultation with the Service, NMFS, and CDFG, as appropriate, through completion of Action-Specific Implementation Plans, as described in the MSCS.
42. The CALFED agencies will closely coordinate with the Service, NMFS, and CDFG during development and implementation of all ASIPs.
43. To the extent that the CALFED Program actions result in changes to land use practices and the impact analysis required by the MSCS shows effects to listed species, ESA, CESA and NCCPA compliance, as appropriate, will occur. The strategy for addressing impacts as described in the MSCS includes appropriate tools such as: (1) assisting with or contributing to completion and implementation of HCPs that address service area effects, as described in section 10(a) of the ESA; (2) including measures to address indirect effects in ASIPs and completing project-specific section 7 consultations on the ASIPs; (3) contributing towards or developing and implementing a conservation program that addresses species critical needs; and implementing the applicable conservation measures, relative to service area impacts, already in the MSCS.

44. The CALFED Program will monitor the baselines of the species addressed in this opinion. Monitoring (for the life of the CALFED Program's Preferred Program Alternative) will be implemented immediately to test and track the CALFED Program's objective that species' baselines are stable or increasing.
45. Any project-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect, and the CALFED agencies shall be adequately funded and staffed to complete tiered project-specific consultations from this opinion and track implementation of conservation actions.

Environmental Baseline

Most of California's threatened and endangered species depend on native habitats that are declining in area and quality. Because these sensitive habitats may host threatened and endangered species, their loss or degradation can often adversely affect multiple species. Factors contributing to the environmental baseline are therefore grouped by habitat type in the analysis below. However, effects from environmental contaminants are typically less specific to particular habitats and are discussed separately. Population status for individual species is described in the species accounts found in Appendix C.

When the CVP began operations, approximately 30% of all natural habitats in the Central Valley had already been converted to urban and agricultural lands. This included loss of more than 80% of the riparian vegetation along the Sacramento River. By the time Shasta Reservoir (the first large CVP facility) began operation in 1944, many of California's natural habitats had been altered dramatically.

Habitat Analyses

Acreage trends in the analyses below are based primarily on Kuehler (1977) and GAP (1996). Kuehler's (1977) map of California's potential natural vegetation (i.e., the potential climax vegetation which exists or has been estimated to exist and would occur if all alterations and disturbances to the respective environments, except reservoirs, were removed) was digitized into Geographic Information System (GIS) format. GAP (1996) included digital information about extent and distribution of habitats from 1990 LANDSAT Thematic Mapper satellite imagery. The minimum mapping unit in GAP data is 100 hectares (247 acres) for upland habitats and 40 hectares (99 acres) for wetland habitats. Because comparisons of acreage figures between the two studies are complicated by differences in habitat classification, percentage changes are approximate. In particular, the areas delineated as potential wetlands by Kuehler (1977)

historically included habitats such as the large lakes of the Tulare Basin, which may be more comparable to the “open water” category of GAP data. Conversely, Küchler (1977) included artificial reservoirs in his map that did not exist prior to European settlement. Definitions of barren/alpine habitat also differ between the two studies. However, the two studies differ in estimation of total acreage by less than 0.1%. The estimated trends in habitat are identified in Table 3.

Delta Aquatic

Habitat Description and Associated Species

The Delta is the uppermost part of the Sacramento-San Joaquin Estuary and is largely a tidally influenced freshwater system. During high flows of fresh water from the Sacramento and San Joaquin Rivers, the mixing zone between fresh and salt water is pushed downstream toward the Golden Gate. The position of the freshwater edge of the mixing zone (also known as X2), where the salt content (salinity) of the water is 2 parts per thousand, is determined by river flows and tides. Plankton (microscopic organisms floating in the water column) are most abundant in the mixing zone, so the vicinity of X2 is high-quality habitat for adult and larval fish that feed on plankton. Shallow aquatic habitats have been identified in the Delta Native Fishes Recovery Plan (Service 1996a) as essential to the long-term survival and recovery of Delta smelt and other resident fish. When the mixing zone is below the Delta in Suisun Bay, a large area of suitable shallow water habitat is in the mixing zone and water temperatures are favorable for growth of plankton.

Federally listed species associated with Delta aquatic habitats include Delta smelt (*Hypomesus transpacificus*), tidewater goby (*Eucyclogobius newberryi*), and Sacramento splittail (*Pogonichthys macrolepidotus*). Listed bird species, such as the California least tern (*Sterna antillarum browni*), or California brown pelican (*Pelecanus occidentalis californicus*), may travel through, winter in or visit Delta aquatic habitats. Delta smelt and Sacramento splittail seek shallow, tidally-influenced, freshwater (< 2 ppt salinity) backwater sloughs and edge waters for spawning. To assure egg hatching and larval viability, spawning areas also must provide suitable water quality (*i.e.*, low concentrations of contaminants) and substrates for egg attachment (*e.g.*, submerged tree roots, branches, emergent vegetation).

Table 3. General Habitats Trend Analysis for CALFED Focus Areas*, historic vs. current estimations. See text for description of estimations.

Habitat Type	Potential Habitat Estimation (acres) (Küchler 1977)	1990 Habitat Estimation (acres) (GAP 1996)	Percentage Difference**
Agriculture	minimal	9,764,504	Not applicable
Alkali Scrub	1,386,185	515,595	-63%
Chaparral	2,755,946	2,749,119	- %
Cismontane Woodlands	10,215,026	11,035,866	+%
Coastal Scrub	340,294	124,075	-64%
Coniferous and Mixed Forests	12,212,249	7,983,387	-%
Grassland	8,930,311	4,327,147	-52%
Riparian	1,192,649	158,944	-87%
Sagebrush	872,070	714,927	-18%
Salt Marsh	156,537	58,356	-63%
Tule Marsh	1,969,013	176,137	-91%
Urban	effectively zero	1,415,279	N/A
Water	156,778	350,116	+123%
Wet Meadow	category not used	57,369	N/A

* Includes the ERP, MSCS, and Watershed Program Focus Areas

**Figures are rounded to nearest whole number.

Habitat Trends

Potential natural vegetation in the Delta included approximately 520,000 acres of tule marsh, covering 72% of the area of the Delta (Küchler 1977). Since the 1850's, the Estuary's tidal

marshes have experienced a cumulative loss of approximately 94 percent (Nichols et al. 1986, Monroe and Kelly 1992). In 1990, the Delta contained 597,624 acres of agricultural land and 49,450 acres of urban land, covering nearly 87% of the area of the Delta (GAP 1996). Tule marshes had been reduced to 8,904 acres, a decline of 98% from the estimate of Kuchler (1977). All wetland and open water habitat combined covered only 71,387 acres, covering less than 10% of the Delta (GAP 1996). Most channels in the Delta have been dredged and shallow wetland habitats have been separated from the river by an extensive levee system.

Water flow and salinity in the Delta is strongly influenced by operations of the CVP and SWP including the Tracy Pumping Plant (CVP), the Banks Pumping Plant (DWR), and numerous smaller water diversions. The storage of runoff in reservoirs as well as diversions of fresh water move the mixing zone upstream, reducing habitat quality for Delta fishes. When river flows are low, and pumps are pulling in large amounts of water, the net flow of water is in the upstream direction in the channel, and fish can be entrained at the pumps and killed. In addition to direct mortality, upstream movement of water can delay migration and increase fishes exposure to predation, poor water quality, and other factors.

Several aquatic non-native species have been introduced to the Delta system (see Nichols et al. 1986). These non-natives have out competed many native species, replacing natural populations. For further information on non-native species, see the Cumulative Effects Section of the Chapter on Effects of the Proposed Action .

Delta Smelt

The current environmental baseline for Delta smelt is established by the March 6, 1995, and the February 12, 1993, (Delta smelt and winter-run, respectively) biological opinions on the effects of long-term operation of the CVP and the SWP, the October 13, 1981, Corps export pumping guidance, the November 2, 1994, biological opinion on the Environmental Protection Agency's proposed Water Quality Standards for the San Francisco Bay/Sacramento-San Joaquin Rivers and Delta in conjunction with the 1995 Water Quality Control Plan, and the statutory mandate pursuant to Section 3406(b)2 of the CVP Improvement Act to manage 800 TAF of water for fish and wildlife purposes. Part of this environmental baseline requires Delta outflows between February 1 to June 30 to transport larval and juvenile delta smelt out of the "zone of influence" of the CVP and SWP export pumps and maintain the location of X2 at or downstream of three distinct points: the confluence of the Sacramento and San Joaquin rivers, Chipps Island, and Roe Island. The length of time X2 must be positioned at these set locations in each month is determined by a formula that considers the previous month's inflow to the Delta and a "Level of Development" factor, denoted by a particular year.

Compliance with the salinity criteria at Roe and Chipps islands can be achieved in any one of the following three ways: (1) the daily salinity value meets the requirement, (2) the system is operated on that day so as to meet the “flow equivalent,” or (3) by using a 14-day moving average. The use of the 14-day moving average allows the mean location to be achieved despite the varying strength of tidal currents during the lunar cycle because any 14 day period would include the full range of spring and neap tidal conditions. Meeting the confluence standard can be achieved by meeting either implementation scheme 1 or 3 above.

Delta modeling conducted by a variety of individuals and agencies for the March 6, 1995 biological opinion analyzed approximately 73 years of hydrologic data from the Sacramento/San Joaquin Rivers and Delta. The analysis showed the average position of X2 would be either downstream of the targeted compliance point or would meet the compliance point through an increase in the number of days, over and above the minimum required, in many of the years. This compliance point has been maintained mainly because the export facilities have not had the ability to capture all of the unimpaired run-off and, thus, have been well below the Export-Inflow Ratio (E/I Ratio) providing better environmental conditions than the minimum required by existing regulations. Therefore, the Service was able to provide the CVP and SWP with a non-jeopardy biological opinion on the long-term operation of their projects. Additionally, the Service anticipated that the estuarine conditions for delta smelt would be improved by (1) the signing of the Framework Agreement leading to the Bay-Delta Accord that would require the CVP and SWP to make an equitable contribution to meet the revised water quality standards, (2) the obligation of Federal agencies carrying out programs for the conservation (recovery) of listed species as imposed by section 7 of the Act, and (3) the scheduled renewal or reopening of water contracts and licenses that would provide an additional opportunity to implement Recovery Plan objectives. Collectively, these actions would result in phased improvement to water quality-based habitat requirements.

Due to subsequent wet years, the regulatory requirements have been met every year since 1995. The CVP/SWP were able to meet the compliance point for X2. The CVP/SWP, because of favorable hydrologic conditions, did not need to manage the system to the E/I ratio all of the time. If these beneficial environmental parameters are maintained over time, it is likely that the species would be heading toward recovery. However, these benefits are offset by new projects that are being proposed which are described later. Therefore, rather than improving the environmental baseline with these good water years, it has simply been maintained. Table 4 identifies the number of required days X2 was to be at specific compliance locations and the actual number of days X2 was at or downstream of the required location. These data are based on preliminary data provided by the California Department of Water Resources, Operations Division. This analysis is consistent with how the Service evaluated the original project for which it issued the March 6, 1995 biological opinion (Service, 1995).

Adult Delta smelt spawn in central Delta sloughs from February through August in shallow water areas having submersed aquatic plants and other suitable substrates and refugia. These shallow water areas have been identified in the Delta Native Fishes Recovery Plan (Recovery Plan) (Service 1995) as essential to the long-term survival and recovery of Delta smelt and other resident fish. A “no net loss” strategy of Delta smelt population and habitat is proposed in this Recovery Plan.

Delta smelt are adapted to living in the highly productive Estuary where salinity varies spatially and temporally according to tidal cycles and the amount of freshwater inflow. Despite this tremendously variable environment, the historical Estuary probably offered relatively consistent spring transport flows that moved Delta smelt juveniles and larvae downstream to the mixing zone. Since the 1850's, however, the amount and extent of suitable habitat for the Delta smelt has declined dramatically. The advent in 1853 of hydraulic mining in the Sacramento and San Joaquin rivers led to increased siltation and alteration of the circulation patterns of the Estuary (Nichols *et al.* 1986, Monroe and Kelly 1992). The reclamation of Merritt Island for agricultural purposes, in the same year, marked the beginning of the present-day cumulative loss of 94 percent of the Estuary's tidal marshes (Nichols *et al.* 1986, Monroe and Kelly 1992).

In addition to the degradation and loss of estuarine habitat, the delta smelt have been increasingly subject to entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle *et al.* 1992). These adverse conditions are primarily a result of drought and the steadily increasing proportion of river flow being diverted from the Delta by the CVP and the SWP (Monroe and Kelly 1992). There is a correlation between the proportion of Delta smelt that reside in Suisun Bay and overall abundance. This relationship indicates that the summer townet index increased dramatically when outflow was between 34,000 and 48,000 cfs which placed X2 between Chipps and Roe islands. Placement of X2 downstream of the Confluence, Chipps and Roe islands provides Delta smelt with low salinity and protection from entrainment, allowing for productive rearing habitat that increases both smelt abundance and distribution.

TABLE 4. Number of days X2 was required at specific compliance stations and the actual number of days achieved shown by year.

Year	Location	# of required days Starting Feb. 1	# of actual days at*** or downstream
1995	Confluence	150	Essentially all year
	Chips Is.	150	Essentially all year
	Roe Is.	130	138
1996	Confluence	150	249
	Chips Is.	150	161
	Roe Is.	65	126
1997	Confluence	150	225
	Chips Is.	110	124
	Roe Is.	49	52
1998	Confluence	150	Essentially all year
	Chips Is.	150	262
	Roe Is.	115	167
1999	Confluence	150	203
	Chips Is.	143	159
	Roe Is.	51	73
2000	Confluence	150	100**
	Chips Is.	150*	100**
	Roe Is.	57*	60**

* Estimated for 2000

** As of May 10, 2000

*** These are estimated days based on electrical conductivity at Port Chicago, Mallard Slough, and Collinsville

The results of seven surveys conducted by the Interagency Ecological Program (IEP) corroborate the dramatic decline in delta smelt attributable to baseline conditions. Existing operations were meant to provide sufficient Delta outflows from February 1 through June 30 to transport larval and juvenile delta smelt out of the “zone of influence” of the CVP and SWP pumps, and provide them low salinity, productive rearing habitat. This zone of influence has been delineated by Water Resources’s Particle Tracking Model and expands or contracts with CVP and SWP combined pumping increases or decreases, respectively (DWR and Reclamation 1993). Tidal action may enhance the hydraulic effects of exports which in turn may effect larvae and juveniles as far west as the Confluence.

According to seven abundance indices which provide information on the status of the delta smelt, this species was consistently at low population levels through the 1980's (Stevens *et al.* 1990). These same indices also showed a pronounced decline from historical levels of abundance (Stevens *et al.* 1990).

Specifically, the summer townet abundance index constitutes one of the more representative indices because the data have been collected over a wide geographic area (from San Pablo Bay upstream through most of the Delta) for the longest period of time (since 1959). The summer townet abundance index measures the abundance and distribution of juvenile delta smelt and provides data on the recruitment potential of the species. Since 1983, (except for 1986, 1993, and 1994), this index has remained at consistently lower levels than previously found. These consistently lower levels correlate with the 1983 to 1992 mean location of X2 upstream of the Confluence, Chipps and Roe islands.

The second longest running survey (since 1967), the fall midwater trawl survey (FMWT), measures the abundance and distribution of late juveniles and adult delta smelt in a large geographic area from San Pablo Bay upstream to Rio Vista on the Sacramento River and Stockton on the San Joaquin River (Stevens *et al.* 1990). The fall midwater trawl indicates the abundance of the adult population just prior to upstream spawning migration. The index that is calculated from the FMWT survey uses numbers of sampled fish multiplied by a factor related to the volume of the area sampled. Until recently, except for 1991, this index has declined irregularly over the past 20 years (CDFG unpublished data, 1999). Since 1983, the Delta smelt population has exhibited more low fall midwater trawl abundance indices, for more consecutive years, than previously recorded. The 1994 FMWT index of 101.7 was a continuation of this trend. This occurred despite the high 1994 summer townet index for reasons unknown. The 1995 summer townet was a low index value of 319 but resulted in a high FMWT index of 898.7 reflecting the benefits of large transport and habitat maintenance flows due to an extremely wet year.

The FMWT abundance index (128.3) for 1996 represented the fourth lowest on record. For 1997, the abundance index (360.8) almost tripled over last years results. In 1998, the summer townet index was 3.3 and the fall index was 417.6, which was up slightly from the 1997 index. Recovery criteria, including both abundance and distribution criteria based on numbers derived from the FMWT, have not been met to date. This limited data indicates that Delta smelt may not be moving toward recovery.

The Service issued a non-jeopardy biological opinion (1-1-95-F-110) for the Delta Wetlands Project after significant negotiations and changes to the proposed project description. The original project description significantly degraded the estuarine conditions by adversely affecting Delta hydrology and causing incremental up-stream shifts of X2. The Delta Wetlands Project, as modified, includes conditions to minimize up-stream shifts of X2 and adverse effects to Delta hydrology within the action area. The Service issued a draft jeopardy biological opinion for the Interim South Delta Program as the original project significantly degraded the estuarine conditions by adversely affecting Delta hydrology and causing incremental up-stream shifts of X2. The Service has also issued a biological opinion for the issuance of a water contract to the County of Sacramento for 35,000 af of water to be diverted from the American River. The opinion for Sacramento County evaluated a phased approach to delivery of new water with very small increments of water to be delivered for the first few years and that the larger amount would be fully evaluated in the context of a broader section 7 consultation when OCAP is reinitiated at the long-term contract renewal phase of CVPIA. Additionally, the Service just completed a consultation with Reclamation concerning additional supplies to Contra Costa Water District (CCWD) under their existing contracts consistent with CCWD's Future Water Supply Program. The outcome of this opinion specifically states that additional supplies over and above those which were authorized in the original biological opinions for the Los Vaqueros Project would not be authorized until a new biological opinion on OCAP was completed or Reclamation reinitiated consultation.

Regarding the operation of the existing consultation for the Los Vaqueros Project, during May and June of 1999, over 100,000 Delta smelt were incidentally taken at the State and Federal export facilities. However, none were found to have entered CCWD's intake at Old River during this same period. Pursuant to the operations plan in the Los Vaqueros biological opinion, there were no diversions during two weeks of the period in question; however, when diversions resumed, no smelt were found to pass through the screen in the monitoring program.

Delta smelt remained in the Delta for an extended period of time during the spring of 1999. It was hypothesized that it was a result of cooler water temperatures. The final summer townet index for 1999 is 11.9, an increase from the 1998 index of 3.3. However, this is still below the pre-decline

average of 20.4 (1959-1981, no sampling 66-68). The FMWT index for 1999 is 864 which is a moderate level.

Other projects, which have not undergone section 7 consultation, have been proposed and include East Bay Municipal Utility District amended contract renewal, development of a long-term contract with El Dorado County Water Agency, numerous Warren Act contracts, funding or facilitation of infrastructure improvements that will allow for additional withdrawals from CVP supplies with CVP facilities, or through other mechanisms. These projects likely would result in a deterioration of the environmental baseline, causing X2 to incrementally move up-stream if these projects proceed as proposed. Degradation of the environmental baseline may significantly affect recovery and survival of Delta smelt

Sacramento Splittail

The decline in splittail abundance has taken place during a period of increased human-induced changes to the seasonal hydrology of the Delta, especially the increased exports of freshwater from the Delta and increased diversions of water to storage. These changes include alterations in the temporal, spatial, and relative ratios of water diverted from the system. These hydrological effects, coupled with severe drought years, introduced, non-native aquatic species, the loss of shallow-water habitat to reclamation activities, and other human-caused actions, have reduced the splittail's capacity to recover from natural seasonal fluctuations in hydrology for which it was adapted.

Analyses of survey data collected from 1967 to 1993 (Meng 1993, Meng and Moyle 1995), further analyses by the Service using data from 1967 through 1997 (Service, 1999), CDFG, University of California at Davis, and biologists from several different studies reveals the following trends:

(1) Overall, splittail abundance indices have declined. Meng and Moyle (1995) demonstrated that on average, splittail have declined in abundance by 60 percent through 1993. These data were updated by the CDFG to include the most current data available. The Service conducted the statistical analysis using the updated information. The results were similar. These updated data demonstrate that on average, splittail have declined significantly in abundance by 50 percent since 1984. The greatest declines (over 80 percent) were found from studies that sampled the shallow Suisun Bay area, the center of the range of the species (Meng and Moyle 1995). The updated information also shows a significant decline (43 percent) for the studies that sampled the shallow Suisun Bay area. The Bay study that began in 1980 in the lower Estuary, at the outermost edge of splittail range, showed the least percent decline (20 percent) (CDFG, unpublished data) through

1993. The Bay study analysis completed on the updated data also showed the smallest decline for study (6 percent). The number of splittail young taken at State and Federal pumping facilities (per acre-foot of water pumped), as of 1993, had declined 64 percent since 1984. With the updated data, the number of splittail young taken at State and Federal pumping facilities demonstrated a 97 percent increase. This percent increase is due to the unusually high salvage that occurred during 1995.

Splittail populations are estimated to be 35 to 60 percent of what they were in the 1940's, and these estimates may be conservative (Moyle in prep). Department midwater trawl data indicate a decline from the mid-1960s to the late 1970s, followed by a resurgence, with yearly fluctuations, through the mid-1980s. From the mid-1980s through 1994, splittail numbers have declined in the Delta, with some small increases in various years. This decline is also demonstrated in the updated Department data.

(2) Overall splittail abundances vary widely between years. Sommer *et al.* 1997 also found that splittail recruitment success fluctuates widely from year to year and over long periods of time. During dry years abundance is typically low. During the dry years of 1980, 1984, 1987, and 1988 through 1992, splittail abundance indices for young-of-the-year were low, indicating poor spawning success. Additionally, all year class abundances were low during these years. In 1994, the fourth driest year on record, all splittail indices were extremely low.

Wet years are assumed to provide essential habitat for splittail and allow populations to rebound from dry years. Successful reproduction in splittail is often highly correlated with wet years. Large pulses of young fish were observed in wet years 1982, 1983, 1986, and 1995. In 1995, one of the wettest years in recent history, an increase in all indices was recorded, as in 1986, which was another wet year following a dry year. However, young of the year taken per unit effort (for example, either the number of fish per net that is towed or the number of fish per volume of water sampled) has actually declined in wet years, from a high of 12.3 in 1978 to 0.3 in 1993. The updated data from CDFG demonstrate this same decline in wet years, from 37.3 in 1978 to 0.6 in 1993. The abundance indices of splittail during the years of 1995, 1996, and 1997 were 44.5, 2.1, and 2.6, respectively. In 1995, a very wet year, splittail abundances were high. However in 1996 and 1997, both wet years, abundance indices were low. A large splittail year class was produced in 1998, a wet year. However, overall splittail declines remain high (82 percent/43 percent with updated data) in the shallow-water Suisun Bay area, the center of its distribution..

(3) A strong relationship exists between young-of-the-year abundance and outflow (i.e., river outflow into San Francisco Bay after water exports are removed). As outflow increases, annual abundance of young-of-the-year splittail increases. Changes in outflow account for 55 to 72

percent of the changes seen in young-of-the-year splittail abundance, depending on which survey data are analyzed.

(4) Splittail are most abundant in shallow areas of Suisun and Grizzly bays where they generally prefer low-salinity habitats. Salinities in Suisun and Grizzly bays increase when, as a result of water exports or drought conditions, the mixing zone (the freshwater-saltwater interface) shifts upstream.

(5) Concentration of splittail in shallow areas suggests that they are particularly vulnerable to reclamation activities, such as dredging, diking, and filling of wetlands. The above data indicate that splittail abundances vary widely in response to environmental conditions, but the general population numbers are declining.

Changes in water diversions are most likely at the SWP. For the most part, the Federal pumping plant has operated at capacity for many years (pumping at rates up to 4,600 cfs), so increased exports at this plant are unlikely. However, the SWP pumping plant and the State Aqueduct have considerable unused capacity. The SWP currently pumps at rates up to 6,400 cfs and plans to increase pumping rates by more than 50 percent. Local private water diversions are relatively stable and export up to 5,000 cfs from about 1,800 diversions scattered throughout the Delta. The DWR (1992) reported past and projected SWP deliveries from Delta sources during the years of 1962 to 2035. In the 1980's, deliveries ranged from 1.5 MAF to 2.8 MAF. By 2010, deliveries of up to 4.2 MAF are planned.

If the exceedingly high take (millions of fish) at the export facilities that occurred in 1995 continues to occur in other wet years, the species may be precluded from recovery. In a good year such as 1995, splittail spawn in prolific numbers. These good years are needed to maintain the population of splittail in the Delta. However, the high take that occurs during these years, offsets the benefits that a strong year class may provide.

Those projects discussed in the Delta Smelt Environmental Baseline section have also under gone section 7 consultation for their effects to splittail (Note: the splittail listing is currently under litigation). Additional future deliveries made south of the Delta through SWP or CVP facilities, additional supplies provided to contractors or new water supply contracts that effect carryover storage in reservoirs, facilities that are developed to divert additional instream flows, or other water development projects that result in losses of instream flows, greater entrainment of splittail, or reduce the areal extent of floodplain inundation for splittail spawning will degrade the environmental baseline for splittail such an extent that it may preclude recovery for the splittail.

Salt Marsh

Habitat Description and Associated Species

The San Francisco Bay complex, including San Pablo Bay and Suisun Bay and Marsh, is the largest estuarine ecosystem in California. Tidal marshes consist of a low marsh dominated by California cordgrass (*Spartina foliosa*) or tules (*Scirpus* spp.), a middle marsh of pickleweed (*Salicornia virginica*), alkali bulrush (*Scirpus robustus*), or cattails (*Typha* spp.), and a high marsh of peripheral halophytes (plants which grow in salty soils) with infrequent tidal coverage. Federally listed species associated with salt marsh habitats include: bald eagle (*Haliaeetus leucocephalus*), California brown pelican (*Pelecanus occidentalis*), California clapper rail (*Rallus longirostris obsoletus*), California least tern (*Sterna antillarum browni*), and salt marsh harvest mouse (*Reithrodontomys raviventris*). Listed plants include soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*), California seablite (extirpated) (*Suaeda californica*), marsh sandwort (*Arenaria paludicola*), and Suisun thistle (*Cirsium hydrophilium* var. *hydrophilium*).

Habitat Trends

Originally, the San Francisco Bay complex included an estimated 181,446 acres of tidal marsh, including 46,405 acres in San Francisco Bay, 63,678 acres in San Pablo Bay, and 71,363 acres in Suisun Bay and Marsh (Service 1984). K uchler (1977) estimated that potential natural vegetation of salt marsh for the CALFED Focus Areas to be 156,537 acres with the San Francisco Bay complex having 96,583 acres of salt marsh; these figures omit the brackish marshes in the Suisun Bay area, which are categorized as tule marsh in K uchler's map.

In 1990, salt marsh and brackish marsh were estimated to cover 69,291 acres, including 54,088 acres in the Sacramento Basin (Suisun Bay and Marsh), 9,443 acres in the Delta, and 4,760 acres in the San Francisco Bay area (GAP 1996). This estimate probably includes large areas of diked marsh, particularly in Suisun Bay where non-tidal diked marshes are managed primarily for waterfowl. Dedrick (1993) estimated that about 30,100 acres of tidal marsh currently remain, representing 17 percent of historical marsh. Some salt marshes have been backfilled, eliminating the high marsh zones and adjacent upland habitat, others are narrow strips bordering dikes. Existing tidal marshes are fragments of the original marshes, and only a few large marshes remain.

Riverine, Riparian, and Floodplain

Habitat Description and Associated Species

Riparian forests of the Central Valley are dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) and willow (*Salix* spp.) near the rivers, with western sycamore (*Platanus racemosa*), California box elder (*Acer negundo* var. *californicum*), and valley oak (*Quercus lobata*) dominating the less frequently flooded higher terraces. Floodplain habitats above the riparian zone typically do not support wetland vegetation, but are hydrologically linked to rivers and riparian forests by periodic flooding and can be considered with them as an ecological unit. Streams historically flooded during the winter rainy season sometimes dry up partially or completely during summer droughts. Several fish species migrate from ocean or estuary habitats to spawn in sloughs, tributary streams, or inundated floodplains throughout the Central Valley. Loss of appropriate spawning substrate has contributed to the decline of several fish species. Sacramento splittail, which migrate upstream to spawn in flooded riparian and floodplain vegetation, have also declined. The endangered shortnosed sucker (*Chasmistes brevirostris*) and Shasta crayfish (*Pacifastacus fortis*) are found in mountain and foothill streams.

The federally threatened Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) occurs in riparian habitats of the Sacramento Valley, Sierra foothills, some Delta levees and tributaries, and the San Joaquin Valley and has declined with loss of habitat. Federally endangered least Bell's vireos (*Vireo belli pusillus*) have not nested anywhere in the Central Valley for several decades, and endangered southwestern willow flycatchers (*Empidonax traillii extimus*) are restricted to the South Fork of the Kern River near Lake Isabella. The federally endangered riparian woodrat (San Joaquin Valley woodrat) (*Neotoma fuscipes riparia*) and riparian brush rabbit (*Sylvilagus bachmani riparius*) are now largely or completely restricted to Caswell State Park on the Stanislaus River, which is the largest remaining tract of riparian forest in the northern San Joaquin Valley. The federally threatened California red-legged frog (*Rana aurora draytoni*) has now been extirpated from 75% of its historic range, mostly in the Central Valley. The endangered California freshwater shrimp inhabits slow-moving freshwater streams in Marin, Sonoma, and Napa counties.

The endangered bald eagle is found along rivers and riparian habitats and is increasing in numbers throughout portions of its range. The Federal candidate species McCloud River redband trout (*Oncorhynchus mykiss* ssp.) and California tiger salamander (*Ambystoma californiense*) are also found in portions of this habitat. Federally listed plant species include Chinese Camp Brodiaea (*Brodiaea pallida*), found along serpentine streams, red hills vervain (*Verbena californica*), Contra Costa wallflower (*Erysimum capitatum* ssp. *angustatum*), Antioch Dunes evening-primrose

(*Oenothera deltooides* ssp. *howellii*), and Pitkin marsh lily (*Lilium pardalinum* ssp. *pitkinense*), which may be found along streams in oak habitats. The yellow-billed cuckoo (*Coccyzus americanus*) has been petitioned for listing under the ESA.

Habitat Trends

Potential natural vegetation within the CALFED Program Focus Areas includes an estimated 1,192,649 acres of riparian habitat, including 837,147 acres in the Sacramento Basin, 288,551 acres in the San Joaquin Basin, 48,123 acres in the Tulare Basin, and 18,828 acres in the Delta (Küchler 1977). Historical acreages of riparian forest have been independently estimated at 1,600,000-2,000,000 acres in the Central Valley (Warner and Hendrix 1985) and 902,000 acres in the San Joaquin and Tulare Basins (San Joaquin Valley Drainage Program 1990, adapted from Hall 1886 and Küchler 1977).

In 1990, riparian habitat within the CALFED Program Focus Areas covered an estimated 159,792 acres (GAP 1996), representing a reduction of 87% from the potential natural vegetation described in Küchler (1977). Regional reductions in riparian habitat were 92% in the Sacramento Basin, 91% in the San Joaquin Basin, 24% in the Tulare Basin, and 86% in the Delta. An estimated 2% of the historical riparian habitat remains on the Sacramento River (McGill 1979, McCarten and Patterson 1987). As a result, riparian-dependent species include several of the most critically endangered species in the Central Valley.

Freshwater Wetlands

Habitat Description and Associated Species

Freshwater wetlands are characterized by a specialized community of aquatic dependent plant species such as the common tule (*Scirpus acutus* var. *occidentalis*), broadleaf cattail (*Typha latifolia*), sedges (*Carex* spp.), spike-rush (*Eleocharis* spp.) and rushes (*Juncus* spp.). Wetlands are usually defined by the types of plants, types of soils, and inundation duration. Wetland types in this category include deep and shallow freshwater marshes, wet meadows, seasonal wetlands, saturated freshwater flat, and vegetated shallows.

Federally listed species associated with freshwater wetlands are: Aleutian Canada goose (*Branta canadensis leucopareia*), bald eagle (*Haliaeetus leucocephalus*), the proposed Buena Vista Lake shrew (*Sorex ornatus relictus*), California red-legged frog, marsh sandwort (*Arenaria paludicola*), giant garter snake (*Thamnophis gigas*), and San Francisco garter snake (*T. sirtalis*

tetrataenia). The California tiger salamander (*Ambystoma californiense*), a Federal candidate species, breeds in freshwater wetlands.

The bald eagle occurs widely throughout the study area. After severe declines due largely to pesticides such as DDT, its numbers have been increasing following new pesticide regulations. Ecosystem degradation in the Central Valley may limit the extent of their recovery in the Central Valley. Eagles use riparian and wetland habitats for resting and foraging. Recovery of bald eagles may be limited by availability of nest trees in riparian and woodland habitat and by declining wetland habitat. California red-legged frogs have been virtually extirpated from the floor of the Central Valley, despite their historic presence in the Central Valley in numbers large enough for commercial harvest. They currently remain only in foothills of the Coast Range and isolated drainages in the Sierra Nevada. The giant garter snake occurs in scattered populations from Butte County south to the central San Joaquin Valley. The Aleutian Canada goose winters in restricted areas of the Sacramento and San Joaquin Valleys. The Buena Vista Lake shrew is restricted to remnant wetland areas near the Kern Lake Preserve and Kern National Wildlife Refuge. The San Francisco garter snake has been reduced to 5 populations that are unprotected, unstable, or declining. Marsh sandwort populations in San Francisco and Santa Cruz Counties have been extirpated by urban development.

Wet meadows may provide habitat for the Kneeland Prairie penny-cress (*Thlaspi montanum* var. *californicum*), water howellia (*Howellia aquatilis*), and Hickman's cinquefoil (*Potentilla hickmanii*).

Habitat Trends

Potential natural vegetation within the CALFED Program Focus Areas included an estimated 1,969,013 acres of tule marshes (Küchler 1977). Independent estimates of historic wetland acreages range from 1,500,000 acres (Warner and Hendrix 1985, cited in San Joaquin Valley Drainage Program 1990) to 4,000,000 acres in the Central Valley (Service 1978), and 1,093,000 acres in the San Joaquin and Tulare Basins (San Joaquin Valley Drainage Program 1990, adapted from Hall 1886 and Küchler 1977).

Freshwater emergent wetlands occupied about 554,000 acres of the Central Valley in the 1940s (Frayer et al. 1989, Central Valley Habitat Joint Venture 1990). By 1990, only 176,137 acres remained (GAP 1996), representing a reduction of 91% from the potential natural vegetation described by Küchler (1977). Regional reductions in freshwater emergent wetlands were estimated at 91 % in the Sacramento Basin, 92 % in the San Joaquin Basin, 92% in the Tulare Basin, 93% in the Delta, and 91% in the San Francisco Bay area.

The hydrology of many of the remaining wetlands has been altered from seasonal to permanent inundation. This change has altered plant communities and facilitated the invasion of introduced aquatic predators such as bullfrogs, bass, and sunfish. These species compete with or prey upon several listed species, including California red-legged frogs and giant garter snakes.

Vernal Pools

Habitat Description and Associated Species

Vernal pools are seasonal wetlands that are unique to the Mediterranean climate region of California and northwestern Baja California and are most abundant in California's Central Valley. Many of the endangered plants and invertebrates that inhabit vernal pools have sporadic and disjunct distributions (i.e., they occur in relatively few pools at a given location and some of these locations are widely separated from each other).

Vernal pools are distinguished by their hydrology and their relationship to adjacent habitat. First, the Mediterranean climate of the region results in most rain falling during the winter. On locally flat land the water tends to pool after each rainfall in small depressions on the land surface. Over time the soils where the wetting and drying continue year after year develop a layer below the surface that becomes resistant to water. In some soils a hardpan of mostly lime develops. In others there is a layer where clay particles have built up. The pools gather water that falls as rain over a small area of relatively flat land and then hold it at the surface until it evaporates during the summer, providing a unique habitat type. Most of these vernal pools are found on sites where the soil has been in place for thousands of years. Over thousands of years a group of species has developed adaptations to the annual wetting and drying cycle and the mineral content of the water in the pools. Other species near pools (particularly co-adapted pollinators) interact with the plants and animals found in the pools themselves. The area comprising the pools, the areas of catchment where the water gathers as rain falls, and the associated species found in the habitat near the pools form a unit that is referred to as a "vernal pool complex". Conservation of vernal pool species depends on maintaining the ecosystem functions of the entire complex.

Federally listed plant species associated with vernal pools include Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*), Sebastopol meadowfoam (*L. vinculans*), Calistoga allocarya (*Plagiobothrys strictus*), Napa bluegrass (*Poa napensis*), Sonoma alopecurus (*Alopecurus aequalis* ssp. *sonomensis*), Colusa grass (*Neostapfia colusana*), Contra Costa goldfields (*Lasthenia conjugens*), Sonoma sunshine (*Blennosperma bakeri*), few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*), Lake County stonecrop (*Parvisedum leiocarpum*), many-flowered navarretia (*N. l.* ssp. *plieantha*), succulent owl's-clover (*Castilleja*

campestris ssp. *succulenta*), Greene's tuctoria (*Tuctoria greenei*), Crampton's tuctoria or Solano grass (*T. mucronata*), hairy Orcutt grass (*Orcuttia pilosa*), Sacramento Orcutt grass (*O. viscida*), San Joaquin Valley Orcutt grass (*O. inaequalis*), slender Orcutt grass (*O. tenuis*), Hoover's spurge (*Chamaesyce hooveri*), and Loch Lomond button-celery (*Eryngium constancei*). White sedge (*Carex alba*), Burke's goldfields (*Lasthenia burkei*), and Kenwood marsh checker-mallow (*Sidalcea oregana* ssp. *valida*) may also be found associated with vernal pool complexes. Most of these species are patchily distributed within the Sacramento and/or San Joaquin Valleys in vernal pool complexes. Calistoga allocarya, few-flowered navarretia, and Loch Lomond button celery are restricted to Napa County. Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*B. longiantenna*), vernal pool fairy shrimp (*B. lynchi*), delta green ground beetle (*Elaphrus viridis*), California red-legged frogs, and vernal pool tadpole shrimp (*Lepidurus packardii*) are federally listed animal species found in vernal pool habitats. The Federal candidate species California tiger salamander also breeds in vernal pools.

Habitat Trends

Holland (1998) mapped the distribution of vernal pool complexes in the Central Valley. Vernal pools are scattered throughout the grassland habitats mapped by Küchler (1977) and GAP (1996) but occur at too fine a resolution to have been adequately mapped as a distinct habitat type by those studies. Holland (1978) estimated that vernal pools occurred historically at varying densities over an estimated 31 percent (4.15 million acres) of the Central Valley, and the Service estimates that 60-85% of historical vernal pool habitat had been eliminated as of 1973 (59 FR 48136).

Inland Dune

Habitat Description and Associated Species

The Antioch Dunes are Pleistocene, wind-deposited sands adjacent to the San Joaquin River east of the City of Antioch in Contra Costa County. Exploitation of the dunes dates back to 1885, with the establishment of a pottery works. Subsequent activities that eliminated and degraded habitat included sand mining, agricultural conversion of sandy soils adjacent to the dunes, industrialization, urban expansion, power line right-of-way and fire break maintenance, and off-road vehicle recreation. Large numbers of black locust and other weedy, non-native plants have invaded the disturbed dunes, displacing endemic species from much of their habitat. Special-status species associated with Antioch Dunes are Contra Costa wallflower, Antioch Dunes evening-primrose, and Lange's metalmark butterfly.

Habitat Trends

For the Antioch Dunes, a 1908 U.S. Geological Survey map shows approximately 190 acres of dune deposits along approximately 2 miles of river front, averaging about 0.17 mile in width (U.S. Fish and Wildlife Service 1984, Howard and Arnold 1980). Today, approximately 70 acres of the original habitat remain, but most is severely degraded and lacks natural dune topography. Since 1980, the Service has owned and managed 60 acres of habitat and buffer as a satellite to the San Francisco Bay National Wildlife Refuge Complex and has negotiated agreements with adjacent landowners (including the Pacific Gas and Electric Company) to protect an additional 20 acres (U.S. Fish and Wildlife Service 1984, Howard and Arnold 1980). The Service has removed the locust trees within the refuge boundary and is actively restoring the dunes.

Interior Grasslands

Habitat Description and Associated Species

Grasslands in the Central Valley were originally dominated by native perennial grasses such as purple needlegrass or tussockgrass (*Nassella pulchra*) and alkali sacaton (*Sporobolus airoides*). Currently, most grasslands in the Central Valley are dominated by introduced annual grasses of Mediterranean origin and a mixture of native and introduced forbs. Please refer to the San Joaquin Valley Native Species Recovery Plan (Service 1998) for a complete description of this habitat and list of common and scientific names of plants and animals.

Federally endangered or threatened blunt-nosed leopard lizards (*Gambelia sila*), San Joaquin kit foxes (*Vulpes macrotis mutica*), giant kangaroo rats (*Dipodomys ingens*), Tipton kangaroo rats (*D. nitratooides nitratooides*), and Fresno kangaroo rats (*D. n. exilis*) occur in arid grasslands in the San Joaquin and Tulare Basins. Grasslands are used by the federally listed Aleutian Canada goose and the proposed mountain plover (*Charadrius maontanus*) for wintering areas. The threatened Alameda whipsnake (*Masticophis lateralis euryxanthus*) is found in grasslands adjacent to chaparral and scrub in Alameda and Contra Costa Counties. The Kern primrose sphinx moth (*Euproserpinus euterpe*) occurs locally in agricultural fields and grasslands in the Walker Basin in Kern County. Reintroduced California Condors (*Gymnogyps californianus*) (in the southern San Joaquin Valley) range widely and may forage in grassland habitat. Federally endangered or threatened plants, such as Bakersfield cactus (*Opuntia treleasei*), California jewelflower (*Caulanthus californicus*), Hartweg's golden sunburst (*Pseudobahia bahiifolia*), San Joaquin adobe sunburst (*P. peirsonii*), Ben Lomond wallflower (*Erysimum teretifolium*), Keck's checkerbloom (*Sidalcea keckii*), and San Joaquin woolly-threads (*Lembertia congdonii*) occur in isolated populations within grassland habitat in the San Joaquin and Tulare Basins. Other listed

plants include Clara Hunt's milkvetch (*Astragalus clarianus*) and Tiburon mariposa lily (*Calochortus tiburensis*) (in serpentine grasslands). The endangered San Joaquin adobe sunburst (*Pseudobahia personii*) is restricted to grasslands on adobe clay soils in the San Joaquin Valley. The large-flowered fiddleneck (*Amsinckia grandiflora*) occurs in grasslands on a few sites in Alameda, San Joaquin, and Contra Costa Counties. Showy Indian clover (*Trifolium amoenum*) originally occurred in grasslands from Mendocino to Santa Clara Counties, but is now extirpated from all but one site in Sonoma County.

Habitat Trends

Less than 1% of remaining grassland areas in the Central Valley contain enough native grass species to be labeled either valley sacaton or valley needlegrass grasslands (GAP 1996).

Alkali Desert Scrub

Habitat Description and Associated Species

Alkali desert scrub is dominated by low succulent chenopod shrubs including iodine bush (*Allenrolfea* sp.), saltbush (*Atriplex* spp.) and seepweed (*Suaeda* spp.). This habitat occurs most commonly on fine-textured, alkaline, or saline soils in areas of impeded drainage. Please refer to the San Joaquin Valley Native Species Recovery Plan (Service 1998) for a complete description of this habitat and list of associated plant and animal species.

Federally endangered or threatened blunt-nosed leopard lizards, San Joaquin kit foxes, giant kangaroo rats, and Fresno kangaroo rats occur in arid grasslands in the San Joaquin and Tulare Basins. Reintroduced California condors, a federally listed species, (in the southern San Joaquin Valley) range widely and may occur in alkali desert scrub habitat. Bakersfield cactus, Hoover's woolly-star, Kern mallow (*Eremalche kernensis*), palmate-bracted bird's-beak, and San Joaquin woolly-threads occur in isolated populations within alkali desert scrub habitat in the San Joaquin and Tulare Basins.

Habitat Trends

Regional declines in alkali scrub habitat range between 63 and 90 percent. Much of the remaining alkali scrub that is suitable habitat for wildlife exists in small, fragmented, and widely distributed patches in the San Joaquin and Tulare Basins. The Küchler mapping designation of San Joaquin saltbush was used to represent the alkali scrub portion of the CALFED Focus Areas and totals

1,386,185 acres (Küchler 1977). By 1990, the potential natural vegetation of alkali scrub was reduced to 515,595 acres or a 63% reduction.

Oak Woodlands

Habitat Description and Associated Species

Several different types of oak woodlands occur in the Central Valley and central coast regions of California. Oak woodlands in the CALFED Program Focus Areas include stands dominated by: valley oak (*Quercus lobata*), mostly along rivers and streams on the valley floor and lower foothills; blue oak (*Q. douglasii*) and gray or digger pine (*Pinus sabiniana*), at low to middle elevations in foothills of the Sierra Nevada and Coast Ranges); coast live oak woodland (*Q. agrifolia*) in valleys and hills of the Coast Ranges; canyon live oak (*Q. chrysolepis*) and interior live oak (*Q. wislizenii*), near some CVP reservoirs; and Oregon white oak (*Q. garryana*) in and near service areas between Redding and Red Bluff. Transitional communities of mixed oaks, other hardwoods, pine, and chaparral occur among many of these woodland types (Forest and Rangelands Assessment Program 1988, Griffin 1977). These oak woodlands correspond to the valley oak savanna, Oregon oak forest, mixed hardwood forest, and blue oak-digger pine forest mapped by Küchler (1977), and can be considered to comprise a “cismontane woodland” category.

Federally listed species associated with oak woodland include: bald eagle, California condor, and California red-legged frog. Reintroduced California Condors (in the southern San Joaquin Valley) range widely and may occur in oak woodland habitat. California red-legged frogs occur in oak woodland in foothills of the Coast Range and isolated drainages in the Sierra Nevada. The candidate California tiger salamander occurs in oak woodland at the fringes of the Central Valley and in the Coast Ranges. The frogs and salamanders live in burrows in these woodlands during dry parts of the year. Suitable habitat for these burrows is essential to their survival. El Dorado bedstraw (*Gallium californicum* ssp. *sierrae*), California jewelflower (*Caulanthus californicus*), Mariposa pussy-paws (*Calyptridium pulchellum*), and San Mateo woolly sunflower (*Eriophyllum latilobum*) may be found in oak/chaparral habitats and Layne’s ragwort (*Senecio laynei*) may be found in serpentine oak woodlands.

Habitat Trends

Potential natural vegetation within the CALFED Program Focus Areas included an estimated 10,199,652 acres of cismontane woodland habitat. In the 1940s, woodland dominated by oaks and other hardwoods covered approximately 2,970,000 acres in the Sacramento Basin, 1,720,000

acres in the San Joaquin Basin, and 950,000 acres in the Tulare Basin (Weislander 1945). In 1990, cismontane woodland habitat within the CALFED Program Focus Areas was estimated at 8,424,391 acres (GAP 1996), representing a 17% decline from potential natural vegetation (Küchler 1977).

Evergreen Hardwood and Coniferous Forests

Habitat Description and Associated Species

Coniferous and evergreen hardwood forests generally occur at higher elevations in the Sierra Nevada and Coast Ranges, on the margins of the Central Valley. This category comprises several forest types. Moist coastal forests in San Mateo and Santa Cruz Counties are dominated by redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*). Montane forests in the Coast Ranges and Sierra Nevada are dominated by a variety of conifers including ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*P. jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*), California red fir (*Abies magnifica*), and white fir (*A. concolor*). In the Coast Ranges, forest stands may be dominated by evergreen hardwoods such as Pacific madrone (*Arbutus menziesii*), tan oak (*Lithocarpus densiflorus*), and California laurel (*Umbellularia californica*). Dry regions support woodlands and savannas dominated by pinyon pine (*P. monophylla*) and California juniper (*Juniperus californica*). On drier sites, stands may be dominated by cypress (*Cupressus* spp.) and fire-dependent species such as Monterey pine (*P. radiata*) and knobcone pine (*P. attenuata*).

Federally listed species associated with coniferous and evergreen hardwood forests are California condor, bald eagle, marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*). The California condor and bald eagle may occur over wide areas and are not specifically limited to coniferous forest. The Sierra Nevada bighorn sheep (*Ovis canadensis californiana*) may be found at higher elevations. The northern spotted owl and marbled murrelet require large tracts of old-growth coniferous forest as nesting habitat and are threatened by conversion to short-rotation forestry practices. Northern spotted owls occur in forests along the western and northern edges of the Sacramento Valley, and marbled murrelets can occur in Santa Cruz and San Mateo Counties. Other species which may be affected include the California spotted owl (*Strix occidentalis*), Yosemite toad (*Bufo canorus*), and mountain yellow-legged frog (*Rana muscosa*), which were recently petitioned for listing.

Habitat Trends

Potential natural vegetation within the CALFED Program Focus Areas included an estimated 12,212,249 acres of coniferous and mixed forest habitat (Küchler 1977). In the 1940s, coniferous forest covered approximately 3,507,000 acres in the Sacramento Basin, 877,000 acres in the San Joaquin Basin, and 414,000 acres in the Tulare Basin (Weislander 1945). In 1990, coniferous and mixed forest habitat within the CALFED Program Focus Areas was estimated at 10,594,862 acres (GAP 1996), representing a 13% decline from potential natural vegetation (Küchler 1977). Hidden within these totals is a shift from commercially valuable redwood and Douglas fir to juniper and other less merchantable conifers. This shift has contributed to declines of species that need habitat with large trees.

Chaparral

Habitat Description and Associated Species

Chaparral habitats in the Coast Ranges are characterized by dense thickets of common chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), scrub oak (*Quercus berberidifolia*), and other shrubs. Chaparral occurs mostly on steep slopes and ridge tops that have thin soils and are hot and dry during the summer. Moister variants of chaparral habitat occur in gullies and on cooler, north-facing slopes (Hanes 1977). The Alameda whipsnake, Presidio clarkia (*Clarkia franciscana*), Presidio or Raven's manzanita (*Arctostaphylos hookeri* spp. *ravenii*), and pallid manzanita (*A. pallida*) are found in chaparral habitats in Alameda, Contra Costa, and San Francisco counties. Other areas may contain Stebbin's morning glory (*Calystegia stebbinsii*), El Dorado bedstraw, white-rayed pentachaeta (*Pentachaeta bellidiflora*), San Benito evening-primrose (*Camissonia benitensis*), and showy Indian clover.

Patches of serpentine, volcanic, and granitic soils occur sporadically along the western flanks of the Sierra Nevada. Listed species associated with this soils are: Chinese Camp brodiaea, Mariposa pussypaws (*Calyptridium pulchellum*), Santa Clara Valley dudleya (*Dudleya setchellii*), Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albidus*), San Mateo thornmint (*Acanthomintha duttonii*), fountain thistle (*Cirsium fontinale* var. *fontinale*), Red Hills vervain (*Verbena californicum*), Layne's ragwort, Tiburon jewelflower (*Streptanthus niger*), Presidio clarkia (*Clarkia franciscana*), and Springville clarkia (*C. springvillensis*).

El Dorado County gabbro soils support the following listed chaparral species: Stebbins' morning-glory, Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron californicum* ssp. *decumbens*), El Dorado bedstraw, and Layne's butterweed. The five El Dorado

County plant species occur primarily in the Pine Hill intrusive complex, a unique and localized geologic formation composed of gabbroic rocks. The Pine Hill intrusion occupies approximately 25,700 acres, and serpentine soils occupy an additional 10,000-15,000 acres in western El Dorado County. These species have a scattered distribution within chaparral and oak woodland Hill intrusion. Both gabbro and serpentine soils strongly influence plant distributions because of nutrient imbalances and other characteristics that favor the growth of plants specifically adapted to these conditions (59 FR 18774; Kruckeberg 1984).

Outcrops of the Ione Formation are primarily restricted to an area of about 35 square miles in Amador County. These outcrops form barren, gravelly, kaolinic soils that are inhospitable for most plants. Kaolin clays are relatively poor at holding several important plant nutrients. The Ione buckwheat (*Eriogonum apricum* var. *apricum*), Irish Hill buckwheat (*E. a.* var. *prostratum*), and Ione manzanita (*A. myrtifolia*) grow in openings within chaparral vegetation on lateritic soils crusts (cement-like crusts of yellow iron oxide) developed under a subtropical or tropical climate during the Eocene. Ione soils exhibit soil properties typical of those produced under tropical climates such as high acidity, high aluminum content, and low fertility (Singer 1978). These soils and the sedimentary deposits with which they are associated also contain large amounts of commercially valuable minerals including quartz sands, kaolinitic clays, lignite (low-grade coal), and possible gold-bearing gravels (Chapman and Bishop 1975). Ione buckwheat and Ione manzanita can tolerate the acidic, nutrient-poor Ione soils and are essentially restricted to this soil type.

Habitat Trends

Fire suppression and reduced fire frequency have caused changes in the structure and species composition of large areas of chaparral. Longer intervals between fires has led to an increase in later successional species and slow-maturing species, greater standing biomass and dry fuels, and larger, more intense fires. Where fire is less frequent, many chaparral species decline. Also, roads, agriculture, and urban development have fragmented the habitat of some species. Changes in fire frequency and fragmentation and have contributed to the decline of several species.

Urban development increases local fire suppression efforts as well as directly removing chaparral habitat. Urban development in the foothills of the western Sierra Nevada, through expansion of residential neighborhoods and road construction and maintenance, has destroyed or degraded numerous populations of listed plants. Residential and commercial development around the communities of Cameron Park and Shingle Springs have caused the greatest losses in gabbro soils habitat. Fifteen active surface mines occur on private land near Ione, where the habitat of listed

plants continues to be degraded. Mining for quartz sand, clay, lignite, laterite, and gravel have destroyed a large proportion of the original habitat.

Coastal Scrub and Coastal Grasslands

Habitat Description and Associated Species

Coastal scrub is characterized by California sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis*), and the coastal grasslands are generally dense grasses in low lying areas or sparse grasses mixed with forbs on hilltops and ridges (balds). Coastal sagebrush occurs mostly on steep slopes and thin soils, and coyote brush is found in deeper soils with minimal slopes. The coastal grasslands are characterized by a mix of native and European grasses. Coastal scrub is typically found adjacent to and interspersed with coastal grasslands.

Callippe silverspot butterfly (*Speyeria callippe callippe*), Mission blue butterfly (*Icaricia icarioides missionensis*), and San Bruno elfin butterfly (*Incisalia mossil bayensis*) are federally listed species that are largely restricted to coastal scrub and coastal grassland on mountains in San Mateo County, including San Bruno Mountain, Montara Mountain, Milagra Ridge, Sweeney Ridge and Skyline College. Isolated colonies also remain locally in San Francisco, Solano, Alameda, Contra Costa and Marin Counties.

Coastal scrub and grasslands may include the federally listed Sonoma spineflower (*Chorizanthe valida*), yellow larkspur (*Delphinium luteum*), and Baker's larkspur (*D. bakeri*).

The Alameda whipsnake is found in coastal sage scrub and chaparral adjacent to grasslands in Contra Costa and Alameda counties. The habitat of this species has been subject to over 150 years of urbanization and over 100 years of fire suppression. The populations of this species are extremely disjunct and genetic exchange between the 5 remaining populations is extremely low or unlikely.

The following serpentine endemics, are found on serpentine outcrops in these habitats: Bay checkerspot butterfly (*Euphydryas editha bayensis*), Clara Hunt's milkvetch, coyote ceanothus (*Ceanothus ferrisae*), fountain thistle (*Cirsium fontinale* var. *fontinale*), Marin dwarf-flax (*Hesperolinon congestum*), Metcalf Canyon jewelflower (*Streptanthus albidus* var. *albidus*), San Benito evening-primrose, San Mateo thornmint (*Acanthomintha duttonii*), San Mateo woolly sunflower (*Eriophyllum latilobum*), Santa Clara Valley dudleya (*Dudleya setchellii*), showy Indian clover, Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*), and white-rayed pentachaeta.

Zayante soils are endemic to Santa Cruz County and occur predominantly near the communities of Ben Lomond, Felton, Mount Hermon, Olympia, and Scotts Valley, as well as the Bonny Doon area. Zayante soils are deep, coarse-textured, poorly developed, and well drained (USDA Soil Conservation Service 1980). A unique habitat within the Zayante sand hills ecosystem is sand parkland characterized by sparsely vegetated, sandstone-dominated ridges and saddles that support a wide array of annual and perennial herbs and grasses. Scattered ponderosa pine trees are often present. Species occurring in this habitat are Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), robust spineflower (*C. robusta*), and Ben Lomond wallflower (*Erysimum teretifolium*).

The following serpentine endemics, are found on serpentine outcrops in these habitats: Bay checkerspot butterfly, Clara Hunt's milkvetch, coyote ceanothus, fountain thistle, Hickmann's cinquefoil, Marin dwarf-flax, Metcalf Canyon jewelflower, Red Mountain campion, San Benito evening-primrose, San Mateo thornmint, San Mateo woolly sunflower, Santa Clara Valley dudleya, showy Indian clover, Tiburon paintbrush, and white-rayed pentachaeta.

Habitat Trends

Much of the former coastal scrub and grassland in the San Francisco Bay Area is urbanized. The majority of the remaining natural habitat is largely restricted to ridges and mountains that are difficult to build on. Coastal scrub and its associated grasslands in San Mateo County have largely been destroyed or degraded by urbanization. The remaining isolated fragments are expected to be developed in the near future. In addition to urbanization, habitat modifications through changes in hydrology and fire frequency, as well as invasion of non-native species, are still affecting most habitats. The map developed by Küchler (1977) estimates that potential natural vegetation within the CALFED Program Focus Areas included 340,294 acres of coastal scrub habitat. In 1990, coastal scrub habitat within the CALFED Program Focus Areas had been reduced to 124,075 acres (GAP 1996), representing a decline of 64% from the potential natural vegetation estimated by Küchler (1977).

Although serpentine habitats are naturally fragmented and separated by areas of different geology and soils, serpentine habitats in the San Francisco Bay area have been severely reduced and fragmented by urban development and related activities in recent decades (Kruckeberg 1984; 57 FR 59053).

Role of Contaminants in the Decline of Species and Habitats

Drainage Water and Selenium Contamination

Soils on the west-side and southern end of the San Joaquin Valley are derived from marine sediments in the Coast Range and contain naturally high levels of arsenic, boron, chromium, molybdenum, and selenium, which are toxic or potentially-toxic trace elements. Evaporation has caused high concentration of these elements in near-surface soils and groundwater in those areas, and application of irrigation water increases these concentrations. Subsurface clay, underlying these contaminated soils, impedes vertical and lateral movement of irrigation water percolating below the root zone (Moore et al. 1990), causing a drainage problem.

To move contaminated water out of these saturated soils, deep ditches have been dug or subsurface drainage systems installed. The drainage systems take away harmful salts and excess moisture, thus lowering the water table to below the root zone for most crops. The effluent from these drains often contains salts, trace elements, and agricultural chemicals. Subsurface agricultural drainage water collected in such systems is pumped away or allowed to drain into surface ditches and canals, eventually discharged into ponds for evaporative disposal, or creeks or sloughs tributary to major streams and rivers. On average, approximately 0.7-0.8 acre-feet of subsurface drainage water is generated annually per acre of irrigated agricultural land on the west side and southern end of the San Joaquin Valley (San Joaquin Valley Drainage Program 1989). The historic and continuing discharge of subsurface drain water into surface waters of the San Joaquin Basin has resulted in degradation of surface- and groundwater quality through salinization and contamination by elevated concentrations of toxic or potentially toxic trace elements and agricultural chemicals.

In the drainage-impaired areas, evaporation ponds and agroforestry plantations are used for disposal of contaminated drain water. In 1990, 28 evaporation ponds (about 7,400 total acres) were utilized to dispose of drain water in Merced, Kings, Kern, and Tulare Counties. These ponds received approximately 30,000-40,000 acre-feet per year from a total of about 55,000 acres of irrigated lands (San Joaquin Valley Drainage Program 1990). Since 1990, the total acreage of evaporation ponds/basins has declined from about 7,000 acres to about 5,000 acres. The ponds are regulated by the Regional Water Quality Control Board by means of Waste Discharge Requirements (e.g., Order No. 93-136) that require creation of clean wetlands to mitigate unavoidable toxic impacts to breeding waterbirds.

Agroforestry disposal of drain water involves irrigation of various combinations of salt tolerant crops, shrubs, and trees with subsurface drainage wastewater. More than 40 agroforestry

drainage water disposal sites were established between 1985 and 1990 (Moore et al. 1990). Given current trends in rising ground water elevations and the general lack of acceptable disposal options other than agroforestry sites, it is expected that the expansion of agroforestry sites will exponentially accelerate within a 5-10 year planning horizon. Although it has been established that agroforestry plantations (like evaporation basins) are wildlife magnets in the extensively cultivated landscape of the San Joaquin Valley (Moore et al. 1990), the potential for contaminant hazards remains poorly documented. A small set of waterbird eggs collected by the Service from just two agroforestry sites in 1996 yielded the highest rates of selenium-induced embryonic malformation ever reported in the scientific literature (Skorupa 1998) and established that the method of furrow irrigation being used was attracting breeding waterbirds.

The extent and severity of the drainage problem in the western and southern San Joaquin Valley continues to worsen. Between 1991 and 1997 the acreage of land in the southern San Joaquin Valley with shallow groundwater rising to within 5 feet of the soil surface—having a drainage problem—has increased from 159,000 acres to 359,000 acres (DWR 1997); therefore, in the past 6 years, an additional 200,000 acres of agricultural lands have been added to the inventory of parcels requiring a disposal option for drainage water to stay in production. Land retirement (retirement from irrigation) is being planned in this area (on a willing seller basis) to remove the lands with the greatest drainage problem from production.

Pesticides

Insecticides, herbicides, and rodenticides have been used for decades throughout the Central Valley, including the CVP service area. Farmers have used insecticides to eliminate crop damage caused by harmful insects and herbicides to reduce crop competition with weeds and other undesirable plants. Rodenticides have been used primarily to reduce or eliminate populations of ground squirrels and other burrowing rodents that can damage flood control levees and water delivery systems.

Beginning in the 1950's synthetic organochlorine (DDT, dieldrin, aldrin, endrin, toxaphene, lindane, chlordane, heptachlor, and Mirex) and organophosphate (*e.g.*, carbaryl and carbofuran) pesticides were extensively and increasingly used. Several organochlorine compounds persist in the soil for many years. In the Central Valley, the California brown pelican, American peregrine falcon, osprey, bald eagle, and California condor were seriously affected by DDT. Use of DDT was banned in the United States in 1972, and all of these species have increased their populations since that time. However, some birds may still be contaminated as a result of illegal or foreign application of DDT.

The quantity of pesticides used in the State--over 120 million pounds in 1980 alone (California Department of Food and Agriculture 1981)--is, in part, a result of the types of crops grown. For example, traditional cotton production uses more pesticides than production of any other crop (Service, undated). Acreage devoted to cotton production in the Tulare Basin increased by 330% between 1940 and 1980. During 1978, about 1.7 million acres in the Central Valley were devoted to cotton production, more acreage than for any other crop (~27% of the irrigated acreage in the Central Valley). The vast majority of the Central Valley's cotton production occurs within the San Joaquin Valley (Reclamation 1984). Of the almost 70 million pounds of pesticides applied in the Central Valley during 1980, a substantial proportion was used to produce cotton in the San Joaquin Valley (California Department of Food and Agriculture 1981).

Effects of Proposed Action

This section discusses the effects of the proposed action on listed, proposed, and candidate species and their critical habitat, including the effects of actions that are interrelated and interdependent with the proposed action that will be added to the environmental baseline. Cumulative effects, which are discussed separately after this section, are the effects of future State, local, or private activities, not involving Federal activities, that are reasonably certain to occur in the action area. Effects are analyzed on an ecosystem level, including all species that could be impacted by the actions. Specific information on individual species can be found in the species accounts in Appendix C. Species of Concern are included in Appendix C for the purposes of providing technical assistance for these species. Specific information on habitat types and trends can be found in the Environmental Baseline section of this opinion.

Direct and Indirect Effects

Direct effects include those effects that are the direct result of the proposed action. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Direct and indirect effects include the effects of interrelated actions (actions that are part of the larger proposed action and depend on the larger action for their justification) and interdependent actions (actions having no independent utility apart from the proposed action).

Scope and Distribution of Effects

The direct and indirect effects of the CALFED Program can occur in the legal Delta, Suisun Marsh and Bay, lands within the Central Valley watershed, the Santa Clara Valley watershed, the upper Trinity River watershed, the southern California water system service area, San Pablo Bay,

and San Francisco Bay by actions such as water impoundments and diversions, agricultural conversion and related operations, urban development, and operations and maintenance of the CALFED Program. Listed species and critical habitat occur throughout the study area on (1) native habitats, (2) agricultural lands, and (3) marginal habitats surrounding reservoirs, conveyance facilities, pumping plants, urban centers, and agricultural lands. Activities associated with the CALFED Program may thus directly or indirectly affect listed species or their critical habitat. For example, upstream water diversions affect the aquatic and riparian species downstream of the diversion. In addition, upland habitats supporting listed species are being converted to agricultural or urban land uses facilitated by availability and use of CVP/SWP water supplies. The CALFED Program may contribute to this habitat loss by improving the supply and reliability of CVP/SWP water.

Timing of Effects

CVP/SWP water is diverted year-round, although the majority is delivered during the spring and summer growing seasons. Water impoundments capture heavy winter and spring run-offs, and diversions reduce water available during other parts of the year. Many species of fish require adequate flows during sensitive periods of their life cycle. Flood flows and spring runoff enhance the ecosystem when they: (1) scour out blocked channels to allow upward migration of fish, (2) supply cool, fresh water needed for spawning, (3) inundate essential spawning habitat to allow for spawning, and (4) assist out-migration of juvenile fish.

Activities associated with agricultural operations often occur during sensitive periods of terrestrial species' life cycles. Ground disturbance and pesticide application often occur during reproductive effort and juvenile growth. Breeding, feeding, and foraging of listed species can be disrupted by agricultural operations during mating, denning, nesting, whelping, or other reproductive behavior.

Loss of adequate flows needed to sustain listed and proposed aquatic species can reasonably be expected to reduce appreciably the likelihood of survival and recovery of those species. However, this should not be the case given the assumptions that (1) the CALFED Program will be implemented in a manner consistent with achieving the recovery goals for listed species identified in the MSCS; (2) actions identified in the ERP will be implemented; (3) the EWA will be implemented as described; (4) flow objectives identified in the ERP will be achieved; and (5) any future storage and conveyance improvements will undergo future tiered section 7 consultation to ensure these improvements are consistent with the conservation needs of listed species and the conservation aspects of the CALFED Program, including the ERP, EWA, MSCS, and Water Quality Plan.

Agricultural operations during the breeding seasons of terrestrial species can reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that (1) any site-specific direct and indirect effects to listed species associated with projects that trigger consultation requirements under section 7 or section 10 will be consulted upon following project-specific analysis and prior to the effect; (2) implementation of the ERP, MSCS, and recovery plans will be an integral part of project-specific consultation; (3) ongoing monitoring and mapping of listed and proposed species baselines is occurring through the Science Program; and (4) listed species baselines are increasing, or at least stable, based upon monitoring.

Nature of the Effects

The pumping, delivery, and application of CVP/SWP water can adversely affect various aspects of the biology of listed species, including reproduction, growth, survival, migration, predator avoidance, and foraging. Conversion of habitats resulting from the construction and operation of CVP and SWP facilities has eliminated or greatly reduced habitat available to listed species. Activities such as water impoundments and diversions, agricultural land conversions and related operations, municipal and industrial development, and operations and maintenance are likely to continue to directly and indirectly affect listed species and their habitat. A detailed description of the nature of the effects of the pumping, delivery, and application of CALFED Program water follows. See Table 5 (following page) for habitats adversely affected by CALFED Program activities. A more complete explanation of habitat trends can be found in the Environmental Baseline section of this opinion.

Table 5. Activities associated with the CALFED Program and the habitats that may be directly or indirectly adversely affected. Actual effects would be determined during tiered project-specific review. An “X” denotes those activities that have the greatest impact on the habitat type, although the other activities may have an impact as well.

Habitat Type	Levee Integrity Program	Water Quality Program	Ecosystem Restoration Program	Water Use Efficiency Program	Water Transfer Program	Watershed Program	Storage	Conveyance	Science Program
Delta Aquatic Habitats	X	X	X	X	X	X	X	X	X
Vernal Pool Habitats			X		X	X	X	X	X
Freshwater Wetland Habitats	X	X	X	X	X	X	X	X	X
Riparian Habitats	X	X	X	X	X	X	X	X	X
Coastal Beach/ Lagoon/Dune Habitats			X	X	X	X	X	X	X
Salt Marsh Habitats	X	X	X	X	X	X	X	X	X
Interior Grassland Habitats	X		X	X	X	X	X	X	X
Alkali Scrub Habitats				X	X	X	X	X	X
Oak Woodland Habitats				X	X	X	X	X	X
Evergreen Hardwood and Coniferous Habitats				X	X	X		X	X
Chaparral Habitats				X	X	X	X	X	X
Coastal Scrub/ Grassland				X	X	X	X	X	X

Water Impoundments and Diversions

Water impoundments and diversions include: construction and upgrading of dams, levees, pumping plants, and conveyance facilities; diversion of water out of the natural water course; and conveyance of the water to a different location. These activities have caused the loss and degradation of listed species habitat such as Delta aquatic habitat, wetlands, riparian corridors, coastal beaches and lagoons, and salt marshes. Diversions reduce the water available to water-dependent listed species such as Delta fishes and riparian- and wetland-dependent species.

The direct and indirect effects of water impoundments and diversions include the following:

1. Effects of impoundment, pumping and conveyance on fish include: direct mortality from pumping activities; mortality when listed fish and their predators are drawn into confined areas (such as the Clifton Court Forebay), leaving them vulnerable to predation; entrainment of fish into water diversion facilities where they are killed by the pumps; reverse flows of waters in the Delta and San Joaquin River which confuse fish and disrupt migration; diversion of fish into canals from which they cannot return to suitable breeding and foraging habitat; prevention of upstream migration by dams; dewatering of portions of the San Joaquin River upstream of its confluence with the Merced River that has eliminated native salmonids from the upper San Joaquin watershed; alteration of the magnitude, timing, and duration of flows; prevention of heavy spring run-off; constriction of low salinity habitat to deep-water river channels of the interior Delta; destruction of spawning, rearing, and refugial habitat; scouring of spawning areas by high flow releases from dams; changes in the hydrologic patterns in Delta waterways; movement of the mixing zone (X2) upstream from compliance points to the interior of the Delta, where foraging and breeding habitat is poor in quality and limited in area; delays in correcting Delta flow problems, caused by time lags of one to three days between water releases from CVP/SWP reservoirs and arrival of water in the Delta; water temperature fluctuations; and loss and degradation of shallow water habitat and salt marsh habitats.
2. Flow regulation affects vegetation structure by preventing regeneration of riparian corridors, changing salt marsh vegetation by altering salinity variability patterns, and degrading coastal lagoons. The vegetation in marshes around Suisun Bay has been increasingly converted from brackish to saltmarsh species due to the diversion of freshwater from the Delta, which has been further exacerbated by droughts. In addition, seasonal and annual variation in flows has been dampened, reducing the

effectiveness of dramatic vegetation shifts that is favored by some listed and sensitive plants and animals.

3. Construction of dams, pumping and conveyance facilities, and levees, as well as preparation of these sites for construction, have footprint effects that cause: direct loss of riparian bottomlands, salt and freshwater marsh and shallow water habitats, grasslands, vernal pools, and other upland habitats; flooding of riparian valleys and degradation of downstream riparian corridors; changes in hydrology and potentially to aquifers; and altered dispersal patterns of terrestrial species due to impassible barriers.

Construction of new facilities, raising existing dam elevations, and modifications of operating parameters of existing facilities may increase the amount of water available, thereby facilitating the continued conversion of native habitat as described below. Project-specific information is needed for a full determination of impacts of new facilities or modifications of existing facilities and operations, so these actions are not covered in this opinion.

Decline of habitats and species numbers would be expected to continue if the volume or reliability of water diversions and impoundments increase. In the absence of adequate conservation and recovery measures, degradation of listed species habitats and lack of recovery of certain listed species would be expected to continue as long as significant amounts of water continue to be impounded and diverted.

Water impoundments and diversions have ultimately led to the listing of many species and can reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the CALFED Program will be managed in a manner consistent with the ERP, MSCS, and Water Quality Program; flow standards identified in the Water Management Strategy, including the EWA and its Operating Principles will be met; CALFED Agencies do not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP or other existing biological opinions is reinitiated and new consultations are completed; conservation actions and assumptions described in the **Description of the Proposed Action** of this opinion are fully implemented; discharges into surface water bodies by CALFED Agency water contractors resulting from CALFED Agency water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (file number 1-1-98-F-21); CALFED Agencies will consult on changes in quantities of deliveries, and in purpose of use under water contracts subject to ESA compliance from Agriculture to

Agriculture/Municipal and Industrial, where listed species may be affected; monitoring is implemented which shows that the baselines of the species in Appendix C are stable or increasing.

Agricultural Conversions and Related Operations:

Agricultural conversions and related operations that will likely be either directly or indirectly facilitated by the CALFED Program include: conversion of native habitats to agricultural fields; conversion of land use to more water intensive purposes; disposal of agricultural drainwater; application of pesticides; and mowing and harvesting operations. Agricultural conversion and related operations have contributed to the loss and degradation of listed species habitat such as Delta aquatic habitat, vernal pools, wetlands, riparian habitats, coastal habitats, grasslands, alkali scrub, oak woodlands, rare serpentine soil habitats, and Antioch dunes habitat. Most of the other types of habitats considered in this opinion have also been affected to some degree by agricultural operations.

The direct and indirect effects of agricultural conversions and related operations subject to section 7 consultation may include the following:

1. Direct loss of upland, riparian, and wetland habitats when native habitats are converted to irrigated agriculture either with associated CVP/SWP allocations or in anticipation of CVP/SWP allocations (e.g., via water transfers, water freed-up by water conservation actions). Conversion of native habitats such as vernal pools and associated uplands occurs by means of plowing and deep-ripping and reduces or eliminates the habitat's suitability for listed species.
2. Potential direct loss of upland, riparian and wetland habitats with the use of new water supplies from raising dams of existing project facilities, from building new project facilities, and from changes in operations improving water supply reliability.
3. Conversion of native habitats to irrigated agriculture indirectly facilitated by the CALFED Program via the following means:
 - a. Use of groundwater augmented by the CALFED Program via 1) recharge from the application of CVP/SWP water to agricultural land; 2) recharge from adjacent project facilities; or 3) recharge from CVP/SWP water applied to water banks.

- b. Use of tail water produced from application of CVP/SWP water to agricultural land.
 - c. Use of recycled water on agricultural land produced from application of CVP/SWP water to municipal and industrial development.
 - d. Use of additional water, locally or through water transfers, made available through the Water Use Efficiency Program.
4. Degradation and fragmentation of remaining habitat, potentially without regard for the need of dispersal corridors, greatly reduces its value for listed species.
 5. Effects to aquatic habitats from agricultural run-off including siltation of stream habitat and reduced water quality.
 6. Effects from agricultural drainwater contamination, an unwanted byproduct of irrigating poorly drained soils on the westside of the San Joaquin Valley include: reduced water quality (*e.g.*, high concentration of total dissolved solids); degradation of surface- and groundwater quality through salinization and contamination by elevated concentrations of toxic or potentially toxic trace elements (*e.g.*, arsenic, boron, chromium, molybdenum, and/or selenium); direct loss of habitat from construction of on-farm disposal options such as evaporation ponds and agroforestry plantations; and adverse biological effects in native species associated with drainage-contaminated habitats. The effects of selenium poisoning on avian species include: gross embryo deformities, winter stress syndrome, depressed resistance to disease due to depressed immune system function, reduced juvenile growth and survival rates, mass wasting, loss of feathers (alopecia), embryo death, altered hepatic enzyme function, and mortality. The potential effects of selenium on mammal species include: gross embryo deformities, reduced longevity, winter stress syndrome, depressed resistance to disease due to depressed immune system function, reduced juvenile growth and survival rates, food aversion and mass wasting, loss of hair and nails, reduced reproductive success, skin lesions, respiratory failure, lameness, paralysis, and mortality. Little information is available for the effects of selenium on reptiles and amphibians. Due to the close phylogenetic relationship between birds and reptiles, reptiles are likely to be similarly effected by selenium as birds. Effects of selenium on fish include: gross embryo deformities, growth inhibition, depressed immune response, mass wasting, changes in blood parameters and tissue structure, edema, reduced activity and

feeding, reduced survival, and mortality. The synergistic effects of selenium and mercury include embryo deformities, embryo death, reduced juvenile survival, behavioral abnormalities, depressed immune response, mass wasting, and mortality.

7. Insecticides, herbicides, and rodenticides applied to agricultural lands can adversely affect listed species by: direct mortality; secondary poisoning of predators and scavengers; degradation of habitat quality following herbicide application; loss of prey base after pesticide application; reduced water quality; impacting native habitat through pesticide and herbicide drift; and loss of pollinators.
8. Effects to terrestrial species include: loss of upland refugia near aquatic habitats; altered migration and dispersal patterns of animals due to large tracks of agricultural land; reduced likelihood of seed dispersal across agricultural fields; reduced survival in degraded habitats within and around agricultural operations; and reduced survival due to necessary operations such as mowing and harvesting.

Land conversion from native habitat to farmland is facilitated in part (directly or indirectly) by the supply of water, and continues to occur. The California Department of Forestry and Fire Protection (1988) predicted a net loss of 775,000 acres of native habitat in the Central Valley from 1980-2010. Between 1990 and 1996, a gross total of approximately 72,700 acres of native habitat were converted to farmland in 30 counties in the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). Net trends in agricultural acreage were negative over this period due largely to land idling in the southern San Joaquin Valley. To identify trends over a longer period, we analyzed DWR land use data collected from 1972 to 1998 for 21 counties in the Central Valley and Central Coast. Although complicated by non-synchronous surveys and inconsistencies in survey area, analysis of these data indicates that net conversion of native habitat to agricultural and urban uses has averaged about 24,000 acres annually. Gross losses of native habitat have been considerably larger, because the net loss includes substantial increases in the “native” category from long-term idling or retirement of farmland. These recently created native lands may not constitute high-quality habitat for listed species. Expansion of agriculture into marginal or upslope lands continues to affect native habitat. The Service has identified at least 9,820 acres of endangered species habitat on 16 sites in Fresno, Kern, Madera, Merced, and Tulare Counties that have been lost to unpermitted conversions between 1997 and 1999. Changes to more intensive farming practices (from dryland farming to irrigated agriculture or from discing to deep-ripping) also can increase the severity of agricultural impacts on endangered species. Continued conversion of native habitats is one of the

greatest threats to the survival of listed species in the Central Valley. The number of listed species in California continues to rise, in large part due to the loss and degradation of habitat from agricultural conversion. Conversions will continue to occur as irrigated/cultivated agriculture in the Central Valley continues to expand.

The effects of CVP/SWP water deliveries on groundwater recharge may have indirect effects on native habitats. The CVP/SWP supplies a significant portion of the irrigation water contributing to aquifer recharge by surface diversion irrigation. In addition, the CALFED Program will evaluate options for increasing groundwater storage in aquifers in the Central Valley.

Groundwater pumping is used in many areas of the Central Valley to substitute for or supplement surface diversion irrigation water during dry years (Williamson *et al.* 1989). As a result, the CALFED Program may contribute to effects on irrigated farmlands and urban uses of water in the Central Valley. Any future evaluation regarding the adverse effects associated with land use changes would take into consideration the very complex interactions between surface and ground waters, the lack of data in many areas as to sources of water used at different times and in different years for irrigation and urban purposes, and the general lack of complete information on groundwater basin characteristics and use, and the complex economic and other factors related to groundwater use conditions.

Decline of habitats and additional listing of species is expected to continue if conversion of native habitat for agricultural purposes continues. Degradation of listed species habitats and lack of recovery of certain listed species is expected to continue as a result of continued agricultural operations and indirect effects of those operations.

Agricultural conversions, which can be an indirect effect of water impoundments and diversions, have ultimately led to the listing of many species and can reasonably be expected to reduce the likelihood of survival and recovery of these species. However, this should not be the case given the assumptions that: site-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect; implementation of the ERP, MSCS, and recovery plans will be an integral part of site-specific consultation; CALFED agencies will work closely with the water users, providing them maps of listed species habitats within their service areas and guiding them through the consultation process to address site-specific effects; conservation strategies identified in the MSCS for service-area impacts will be in place for districts or areas receiving water made available through the CALFED Program; the Water Management Strategy, including the EWA, are implemented consistent with operating principles and species recovery goals; CALFED agencies will not implement additional discretionary actions beyond those listed in the OCAP biological opinion, this biological opinion, or any other previously completed biological opinion (e.g., new contracts, contract amendments, facility construction) that would

incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed; CALFED agencies and contractors comply with all programmatic and tiered opinions related to the CALFED Program; the CALFED Program will ensure full implementation of the conservation actions described in the **Description of the Proposed Action** of this opinion, including the ERP, MSCS, and Water Quality Program; discharges into surface water bodies by CALFED agencies resulting from CALFED Program-related water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); CALFED agencies will consult on all changes in quantities of deliveries and in purpose of use under water contracts subject to ESA compliance from Agriculture to Agriculture/Municipal and Industrial, where listed species may be affected; and Science Program monitoring is implemented which shows that the baselines of the species in Appendix C are stable or increasing.

Municipal and Industrial Development

Municipal and industrial development facilitated by the CALFED Program could include the following: conversion of native habitat to municipal and industrial uses; conversion of agricultural land for municipal and industrial uses; construction of infrastructure and supportive networks; pesticide and herbicide application; and recreational uses. Municipal and industrial development has contributed to the loss and degradation of all of the habitats described in the Baseline section of this opinion.

The direct and indirect effects of municipal and industrial conversions that may be facilitated by the CALFED Program include the following:

1. Direct loss of upland, riparian and wetland habitats when native habitats are converted to municipal and industrial land use either with associated CVP/SWP allocations or in anticipation of CVP/SWP allocations (e.g., via water transfers, water freed-up by water conservation actions or land retirement). Conversion of native habitats to municipal and industrial development eliminates the habitat's usefulness for listed species.
2. Potential direct loss of upland, riparian and wetland habitats can occur with new supplies from raising dams of existing project facilities or from building new project facilities.
3. Conversion of native habitats to municipal and industrial development may occur via the following means:

- a. Use of groundwater augmented by the CALFED Program via (1) recharge from the application of new water supplies to agricultural land; (2) recharge from adjacent new facilities; or (3) recharge from water applied to water banks.
 - b. Use of recycled water produced from application of CALFED Program water to municipal and industrial development.
4. Degradation and fragmentation of remaining habitat, potentially without regard for the need of dispersal corridors, reducing its value for listed species, including extreme degradation of rare habitats found only in a certain region (*e.g.*, serpentine and gabbro soils).
5. Recreational disturbance effects including: off-road vehicle use which disturbs and degrades habitats such as dunes; recreational use of beaches that degrades habitat; trampling by hikers, dogs, and horses; disturbance to the normal behavioral patterns of native species; and other human recreational disturbances that degrade upland habitat and disrupt the natural cycles of native species.
6. Development of infrastructure and supportive activities including: road construction and maintenance which eliminates, fragments, and disturbs habitat; energy development that eliminates upland habitat; freshwater discharges from waste water facilities that alter salt marsh habitats; fire suppression for protection of human habitations, resulting in degradation of fire-dependent habitats such as chaparral; clearing of uplands for fire breaks; power line installation and maintenance; and waste disposal sites that eliminate habitat such as serpentine soils.
7. Effects from urban development including: increased erosion; increased roadkill incidence; increased pesticide use; increased predation by pets and introduced animals such as red foxes; and reduced water and air quality.

It has been estimated that between 12,000 and 50,000 acres of land are converted from agricultural use to urban use per year in the Central Valley of California, a number that is expected to increase in the future (Sokolow, 1997). Conversion of agricultural land to urban use between 1995 and 2040 has been predicted to exceed 1,000,000 acres (Thompson et al. 1995). Between 1990 and 1996, approximately 101,700 acres were converted to urban land use in 30 counties in the Conservation Program Focus area (California Department of Conservation 1994,

1996, 1998). This figure includes 49,705 acres of farmland, 20,476 acres of grazing land, 113 acres of water, and 31,366 acres of other land (predominantly native habitat). Urban lands are unsuitable habitat for many species that are able to persist in agricultural landscapes, and are virtually impossible to restore as wildlife habitat. Because one acre of irrigated agricultural land requires more water than that same acre in urban use, conversion of agricultural land to municipal and industrial use frees up some water that might be used to convert additional native habitat. Reducing water deliveries during drought is also more difficult on urban lands than on agricultural lands, so agricultural to urban conversions reduce the flexibility of the CALFED Program to respond to water shortages.

Several rare habitat communities (such as those on gabbro soils and serpentine soils) are currently under increasing pressure to be developed for municipal and industrial uses. Decline of habitats and species numbers is expected to continue as urban expansion persists and the population of California continues to rise. Degradation of listed species habitats and lack of recovery of certain listed species is expected to continue as a result of indirect impacts from urban centers.

Municipal and industrial development, which can be an indirect effect of water impoundments and diversions, can reasonably be expected to reduce the likelihood of survival and recovery of these species, because once the development has occurred, the opportunity of utilizing the land to contribute to survival and recovery is foreclosed. However, this should not be the case given the assumptions that: site-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect; implementation of the ERP, MSCS, and recovery plans will be an integral part of site-specific consultation; CALFED agencies will work closely with the water users, providing them maps of listed species habitats within their service areas and guiding them through the consultation process to address site-specific effects; conservation strategies identified in the MSCS for service-area impacts will be in place for districts or areas receiving water made available through the CALFED Program, where appropriate; the Water Management Strategy, including the EWA, are implemented consistent with operating principles and species recovery goals; CALFED agencies will not implement additional discretionary actions (e.g., new contracts, contract amendments, facility construction) that would incrementally increase diversions and alter hydrologic and environmental conditions in the Delta until consultation on OCAP is reinitiated and completed; CALFED agencies and contractors comply with all programmatic and tiered opinions related to the CALFED Program; the CALFED Agencies will ensure full implementation of the conservation actions described in the **Description of the Proposed Action** of this opinion, including the ERP, MSCS, and Water Quality Program; discharges into surface water bodies by CALFED agencies resulting from CALFED-related water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (number 1-1-98-F-21); CALFED agencies will consult on all changes in

quantities of deliveries and in purpose of use under water contracts subject to ESA compliance from Agriculture to Agriculture/Municipal and Industrial, where listed species may be affected; Science Program monitoring is implemented which shows that the baselines of the species in Appendix C are stable or increasing.

Operations and Maintenance

Operations and maintenance activities include mowing, levee maintenance, dredging, pest control, erosion control, and flood control. Operations and maintenance activities can contribute to loss and degradation of most of the habitats listed in the **Environmental Baseline** section, but have the most impact on Delta aquatic habitats, vernal pools, wetlands, riparian habitats, grasslands, and alkali scrub.

The direct and indirect effects of operations and maintenance activities can include the following:

1. Canal maintenance or dredging that disturbs wetland habitat, increases siltation, and disturbs the normal behavior of listed aquatic species.
2. Direct mortality from vehicle traffic, mowing, and burning on levees and near canals.
3. Flood control (including flow restrictions, levee maintenance and installation of riprap) can interfere with the natural regeneration processes of forests and alter other upland and wetland habitats by removing vegetation or changing patterns of disturbance and sediment deposition.
4. Continued disturbance of habitats around facilities through maintenance activities prevents reestablishment of native habitat and disturbs hibernating or denning species.
5. Insecticides, herbicides, and rodenticides applied around facilities can adversely affect listed species through: direct mortality; secondary poisoning of predators and scavengers; degradation of habitats following herbicide application; loss of prey base after pesticide application; reduced water quality; pesticide and herbicide drift; and loss of pollinators.

Degradation of listed species habitats and mortality and disturbance of listed species is expected to continue as a result of continued operations and maintenance activities associated with CALFED Program facilities.

Operations and maintenance activities can reasonably be expected to reduce the likelihood of survival and recovery of these species. However, this should not be the case given the assumptions that: O&M plans are developed and implemented by CALFED Agencies and are consistent with section 7(a)(1) of the ESA; CALFED agencies will ensure full implementation of conservation actions described in the **Description of the Proposed Action** of this opinion, including the measures identified in the ERP, MSCS, and Water Quality Program; site-specific effects to listed species will be addressed through project-specific analysis and implementation of avoidance, minimization, and compensation measures in compliance with the MSCS and this opinion; implementation of and conformance with the ERP, MSCS, and recovery plans will be an integral part of management actions; discharges into surface water bodies resulting from CALFED Program water impoundments and diversions will comply with the standards set in the biological opinion on the California Toxics Rule (Service File # 1-1-98-F-21); monitoring is implemented which shows that the baselines of the species in Appendix C are stable or increasing.

Duration

The temporal effects of the CALFED Program can be divided into three types, based on duration of effect.

1. Short-term events whose effects are relaxed almost immediately. Routine maintenance activities tend to be short-term events.
2. Sustained, long-term events whose effects are not relaxed. Water flows vary from year to year depending on available flows and contract deliveries. The continued impoundment, pumping, and diversion of water has long-term effects on species dependent on historical water flows.
3. Permanent events that set a new threshold for some feature of a species' environment. The construction of dams and the corresponding loss of a riparian corridor and the surrounding land due to flooding is an example of a permanent event. Conversion of land for intensive agricultural uses or urban centers also permanently removes that habitat for use by listed species dependent on that habitat.

The CALFED Program was initiated to provide a steady water supply to water users. As such, the effects of the CALFED Program tend to be sustained events or permanent changes.

Disturbance Frequency, Intensity, and Severity

Water is diverted every year to fulfill various water rights and water contracts. Most agricultural fields are irrigated every year, although the intensity of irrigation may vary from year to year depending on available water. Some fields are fallowed each year. In the event of a prolonged low-flow period, the effect of continued diversions on listed species would be greater. Pesticides are applied every year, often more than once a year, on most fields.

Conversions of habitat indirectly caused by the CALFED Program could reduce the range of many listed species. Listed species may or may not be able to recover from repeated disturbance, depending on the sensitivity of the species, the severity of the disturbance, and the other stressors in its environment. Listed species tend to be more sensitive to disturbance and habitat loss, simply due to their restricted range. Each species will react differently to the disturbance. Refer to the individual species accounts in Appendix C for explanation of the reasons for decline and sensitivity to disturbance.

Even relatively small land conversions indirectly caused by the CALFED Program in rare habitats such as gabbro soils, serpentine soils, dunes, and vernal pools can significantly reduce the range of already rare species. This can be especially true of listed plant species that are dependent on specific soil types for survival, as well as the animal species that utilize those plants.

The disturbances and habitat loss that could be caused by the CALFED Program could leave species more vulnerable to other stressors in their environment, such as floods, drought, fires, disease, pollution, and predators. Species with severely restricted ranges become vulnerable to inbreeding, hybridization with other subspecies, and genetic drift. Severe or moderate disturbances can decrease the recovery rate of a species or reduce the chances of recovery. Many direct, indirect, interrelated, and interdependent effects of the CALFED Program are expected to occur.

Effects of CALFED Program Elements

Levee System Integrity Program

The Levee System Integrity Program includes programs to: reconstruct Delta levees to a uniform base-level of protection; provide above base-level flood protection for some Delta islands; minimize risks to levee integrity due to subsidence; enhance existing emergency management response; prepare a Delta Levee Risk Assessment and Risk Management Strategy; evaluate the appropriate level of protection for Suisun Marsh levees and evaluate the best method of protection; and facilitate funding and the permitting process for these projects. Similar programs have been implemented throughout the CALFED Program study area in the past by the Corps of Engineers, DWR, and local jurisdictions. Programs that have affected listed species include PL 84-99, Sacramento River Flood Control System Evaluation, Sacramento Bank Protection Program, American River Watershed Investigation, and numerous other smaller programs and local projects. Such activities in the past have caused habitat loss, fragmentation and degradation; habitat conversion; disrupted vital behavior such as reproduction, foraging and escape from predators, and resulted in direct take through construction and maintenance activities. Similar projects have impacted Delta aquatic habitats, vernal pool habitats, wetlands (permanent, seasonal, freshwater, brackish), riparian corridors, grasslands and coastal habitats. Site-specific information has not yet been developed for projects to be implemented under the Levee System Integrity Program, so these actions are not covered by this opinion. Discussion of effects of the program are based on the types and scope of projects expected.

Direct effects:

Projects to reconstruct levees to a uniform base-level of protection, increase protection above base-level, and to minimize subsidence and increase levee integrity may result in take through construction activities. Listed species may be killed or injured by construction equipment, during dredging, excavation, and fill, and may suffer vehicular mortality from increased traffic from construction and personnel vehicles accessing construction areas. Dewatering during construction may result in stranding and mortality of aquatic species. Normal behavior patterns may be disrupted by construction activities, impairing breeding, feeding and sheltering. Listed species may be displaced into unsuitable habitats and may suffer increased risk of vehicular mortality, predation, intra- and interspecific competition, disease, and starvation. Use of dredge materials in levee repair could mobilize contaminants bound to Bay and Delta sediments and could result in death or injury of listed species. Contaminants released during dredging and use of dredge materials may result in impaired reproduction, foraging, and sheltering, and increased susceptibility to disease and predation.

Habitat modification as a result of construction activities may also impair essential behaviors such as breeding feeding, and sheltering. Habitat may be lost or degraded due to construction activities. Vegetation may be cleared and grubbed from construction areas, resulting in a loss of habitat (both temporary and permanent), protective cover, retreat sites, movement corridors, and foraging areas. Removal of vegetation may result in increased flows, runoff, erosion, and siltation.

Increasing base levels of protection may result in standardization of levee profiles, resulting in increased levee footprints. Construction of expanded levee profiles may result in loss of habitat on and adjacent to existing levees, including loss of riparian vegetation, wetlands, agricultural lands that provide habitat values, grasslands, and aquatic habitats. Techniques to increase levee integrity, such as stability and seepage berms, will also increase levee footprint/profiles and may result in loss and degradation of habitats. Other methods to control seepage, such as eliminating or relocating canals, waterways, and seasonal and permanent wetlands near levees, may result in temporal and permanent loss of habitat. Geotechnical engineering practices (such as geotechnical fabric, soil over rock designs) may decrease a levee's ability to support vegetative cover and result in permanent loss or degradation of habitat. Levee protection techniques that result in an impermeable surface or subsurface may result in loss of vegetative cover, loss of retreat sites for listed species, and loss of prey species that support listed species. Installation of impermeable surfaces and subsurface eliminate soil crevices and burrows that provide retreats from predators, retreats from temperature extremes, estivation sites for listed species and prey of listed species (such as tree frogs, bullfrogs, lizards), and also results in a loss of small mammal prey species. Replacement of vegetation with hard structures (e.g., rock riprap) may result in loss of foraging habitat, movement corridors, loss of vegetative cover and subsurface retreat sites, may present barriers to normal movements, and may increase runoff, siltation, and contamination of waterways.

Indirect effects:

Reconstructing levees to a uniform or to increased levels of protection, and to increase levee integrity may preclude restoration actions that are considered necessary for recovery. Reconstruction of existing levees may preclude consideration of setback or cutoff levees that would restore natural hydrologic regimes and processes essential to provide functioning ecosystems upon which listed species depend. Implementation of a levee integrity may also restrict and preclude restoration of habitat in the vicinity of reconstructed levees, contributing to loss of movement corridors and continued fragmentation of habitat.

Indirect effects of levee improvements include alteration of the timing, magnitude, frequency and duration of water flows. Levee integrity improvements to control seepage may change hydrology of surface and ground waters. Increased flood protection may facilitate conversion of habitat to urban or agricultural uses, or may cause conversion to more intensive agricultural uses (i.e., irrigated pasture converted to row crops, vineyards, or orchards).

Indirect effects of bringing levees to the PL 84-99 standard (or other standards with similar effects) include maintenance activities required for eligibility for post-flood Federal disaster assistance. Maintenance activities are intended both to maintain levee integrity and to maintain ease of inspection so that damage such as boils, slumping, erosion, and subsidence can be easily detected. Maintenance activities include road repair, removal of woody vegetation, mowing, burning, discing, grading, herbicide application, and rodent control, including use of burrow fumigants and poison baits. Listed species may be killed or injured during any of these activities. Vegetation control may remove or degrade habitat and result in loss of cover, increased predation, loss of foraging areas, and retreat sites. Removal of vegetation may contribute to erosion, increased runoff, siltation, and contamination of waterways and wetland and aquatic habitats. Removal of vegetation may also alter hydrology by increasing runoff, timing, magnitude, frequency and duration of flows. Continued maintenance and vegetation control may prevent and preclude reestablishment of habitat on or in the vicinity of levees. Maintenance activities may disturb or disrupt essential behavior such as feeding, breeding and sheltering. Individuals may be displaced into unsuitable habitats and may suffer increased risk of mortality due to predation, vehicular strikes, increased inter- and intraspecific competition, disease, and starvation. Non-target species may be killed or injured by use of herbicides and pesticides. Use of herbicides and pesticides may contaminate wetlands or waterways and may result in impaired reproduction, foraging, and sheltering, and increased susceptibility to disease and predation.

In addition to maintenance activities, repairs under the PL 84-99 program, or similar programs, may result in take of listed species. Eligibility for public assistance may increase the frequency, number of sites, and acreage of impact of repair activities. Additional funding may also increase the frequency and amount of repair activities. If disturbance frequency exceeds the recovery rate of the affected species, declines in species numbers, reproduction, and distribution may occur.

Levee repair, improvement, and construction projects could ultimately lead to the listing of many species and could reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the conservation actions described in the Description of the Proposed Action will be fully implemented, including, but not limited to, the ERP, the Watershed Program, and the MSCS; CALFED agencies will request adequate funding for the conservation programs as necessary to

implement this biological opinion; adaptive management will be used to assess projects and programs and if found to interfere with recovery, the project or program will be modified or terminated; implementation of, and conformance with, all recovery plans will be an integral part of all site-specific consultations; the CALFED Agencies will closely coordinate with the Service during development and implementation of all O&M Plans and Resource Management Plans; any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect, and the Service and the CALFED Agencies are adequately funded and staffed to complete tiered site-specific consultations from this opinion and track implementation of conservation actions.

Water Quality Program

The Water Quality Program is designed to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses, and to achieve continuous improvement in the quality of water of the San Francisco Bay-Delta estuary. The success of the Water Quality Program, however, will depend upon close coordination with other CALFED Programs.

Paired with the Watershed Program, the Water Quality Program would improve overall water quality by reducing the loading of constituents (e.g., heavy metals, pesticides, residues, salts, selenium, pathogens, suspended sediments, temperatures, bromides, and total organic carbon) that enter Delta tributaries from point and non-point sources. Moreover, elements from these two Programs could reduce adverse concentrations of contaminants contained in receiving waters. The long-term impacts of the Watershed Program on water quality are expected to be beneficial. By reducing the mass of pollutants reaching the Delta from tributary streams, the program would improve in-stream water quality and provide benefits to CALFED target species. In-stream water quality would be improved in the Sacramento River and San Joaquin River Regions, and the reduced contaminant load in Delta outflow would benefit species in the Bay Region.

The Water Quality Program would result in general water quality benefits when paired with the Water Use Efficiency Program. The Water Use Efficiency Program provides incentives for water conservation and water recycling. Water use efficiency could reduce diversions from Delta channels and subsequently reduce the loads of contaminants returned to the channels thereby benefitting CALFED target species through reduced entrainment and impingement. Because one of the goals of the Water Use Efficiency Program is to focus on achieving benefits related to flow timing, reduced diversions could aid in the dilution of agricultural tailwater when discharged to a stream.

The Water Transfer Program could affect water quality, positively or negatively, depending on the timing of the water transfer. Water transfers could change river flows and subsequently, water temperatures. In addition, the source of water for a transfer and the timing, magnitude, and pathway of that transfer could affect species positively or negatively, depending on how that transfer occurs. Beneficial water quality impacts from water transfers would occur when the transfer would decrease concentration of contaminants through increased stream flow or through the transfer of water from a higher quality source. Because water transfers have the ability to positively or negatively affect water quality, analysis of water transfers will be evaluated on a case-by-case basis.

Improvements to Delta levees, under the Levee System Integrity Program, would result in short-term adverse effects on water quality during the waterside construction phase of the project. Toxic substances contained in old levees or in channel sediments could be released during levee work or while dredging. However, levee improvements would likely reduce the risk of failure during earthquakes and floods or as a result of gradual structural deterioration. A catastrophic levee failure could result in rapid sea-water intrusion thus increasing salinity in the Delta. This in turn could cause adverse effects to listed species habitats, food base, and behavior.

Surface water storage along with Delta conveyance improvements could adversely effect water quality by increasing turbidity during the construction phase. Excess sediment could be discharged into the various waterways which in turn could cause increased predation on native species or inhibit their ability to successfully forage. The storage of water in surface reservoirs could also adversely affect water quality. As new reservoirs are constructed, previously dry lands would become inundated and trace elements, including mercury, could become mobilized and then released to streams and the Delta. Water stored on Delta islands could increase Total Organic Carbon production. Surface water storage could also adversely affect Delta hydrology. Reservoirs typically are use to store water during abundant spring flows for later use in dry months or years. Thus, spring flows would be reduced or eliminated compared to unimpaired flows, and flow during dry periods would be increased.

However, surface storage could also provide environmental benefits if operated during periods of environmental concern (e.g., during upstream migration periods, when fish are spawning, etc.). Surface water storage could increase flexibility to provide for additional fresh-water releases and Delta inflows that could improve Delta water quality for ecosystem protection. These benefits would be most apparent in dry months and seasons when additional water would be needed to meet environmental needs, such as attraction flows and reduced in-stream temperatures. Upstream storage releases could also augment Delta outflows when needed to control sea-water intrusion and optimize estuarine conditions for the ecosystem and dependent fish species (as

indicated by the position of X2). Because water storage operations would have the ability to positively or negatively affect water quality, each storage facility must be considered on a case-by-case basis.

Overall, the Water Quality Program is designed to reduce the discharge to waterways of contaminants from municipal and industrial wastewater, urban and agricultural runoff, and drainage from abandoned mines. This reduction, in the long-term, would improve water quality in the Bay-Delta system and improve habitat conditions for CALFED target species.

Ecosystem Restoration Program

The ERP is intended to achieve “recovery” or “contribute to recovery” of listed species in the Bay-Delta watershed through the implementation of restoration actions. The ERP identifies over 600 programmatic actions addressing several ecosystem elements that will be implemented throughout the Sacramento-San Joaquin River basin and Bay-Delta. Thus, fish, wildlife, plants, and the ecosystems upon which they depend would benefit from implementation of the ERP in a number of ways.

The ERP would restore and maintain ecological processes and structures that sustain healthy fish, wildlife, and plant populations. In conjunction with other programs such as CVPIA AFRP and the EWA, the ERP would increase the abundance and distribution of desired aquatic species including, but not limited to, delta smelt, Sacramento splittail, and sturgeon. In the first stage of ERP implementation, these aquatic species would begin a trajectory toward recovery from improved and reestablished ecosystem processes, including streamflow, sediment supply, floodplain connectivity, stream temperature, and biological productivity. Restoration of aquatic areas through setback levees and biologically constructed levee fixes would increase species habitat, and new fish screens would reduce entrainment losses. Likewise, the ERP would provide benefits to terrestrial vegetation and wildlife. The ERP would result in net increases in area for target habitat supporting plant and wildlife species, including special-status species. Measures would protect natural habitats from future activities and would reconstruct the historical pattern of habitats in the CALFED Program regions. Major categories of these actions, organized by Ecosystem element, and their effects on listed species are identified below.

The MSCS contains a detailed accounting of both the adverse and beneficial effects of ERP actions on specific species and their habitats. The effects analysis in the MSCS is incorporated into this document by reference.

Water Use Efficiency Program

The Water Use Efficiency Program contains measures designed to manage the use of new and existing water supplies. These include measures to: support ongoing urban and agricultural sector processes for certifying and endorsing local agency implementation of cost-effective efficiency measures; provide technical and planning assistance to local agencies and districts in developing and implementing water use efficiency measures; and, institute a competitive grant/loan incentive program to encourage water use efficiency investments in the urban/industrial and agricultural sectors. The four WUE Program areas include Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands. Important linkages exist between the WUE Program and other CALFED programs. Many of these programs, and their effects, are discussed in detail under the respective portions of this opinion. Conversions of native and agricultural habitats and related operations either directly or indirectly facilitated by increases in water supplies made through conservation can include: conversion of native habitats to agricultural use; conversion of agricultural land to more water intensive purposes; conversion of agricultural land to urban use; pesticide application and runoff, and contaminant loading; and, changes in hydrology, water flow timing and structure. These operations have contributed to the loss, degradation or conversion of listed species habitat such as riparian corridors, annual grasslands, certain types of agricultural lands, vernal pools, aquatic and coastal habitats. Most of the other habitats discussed in this opinion have been impacted by water conservation measures to some degree.

Direct effects of agricultural water conservation:

Implementation of the WUE Program may include implementing measures on existing agricultural lands and waterways, such as: lining canals and waterways with concrete or other impermeable surfaces to prevent or decrease seepage and percolation; constructing covered canals or pipelines to prevent evaporative losses; control and removal of vegetation in and adjacent to canals and waterways to decrease loss of water through evapotranspiration; and regrading and leveling of agricultural lands to improve distribution uniformity of irrigation water. Listed species such as the giant garter snake may be killed or injured by heavy equipment during construction activities necessary to line canals, construct pipelines, mechanically remove vegetation, and grade and level agricultural lands. Dewatering during construction results in stranding and mortality of aquatic species. Normal behavior patterns will be disrupted by construction activities, impairing breeding, feeding and sheltering. Listed species may be displaced into unsuitable habitats and may suffer increased risk of vehicular mortality, predation, intra- and interspecific competition, disease, and starvation.

Methods of decreasing losses of water during conveyance may result in loss of natural habitat associated with irrigation and drainage canals, including seasonal and permanent wetlands and riparian vegetation along and adjacent to waterways. Water use efficiency programs for agricultural water uses will result in a reduction of agricultural irrigation and drainage water to support natural habitat areas. Lining or burying canals and waterways and removing vegetation along canals and waterways will result in loss and degradation of habitat, loss of protective cover, foraging areas, retreat sites, and movement corridors. Loss of cover and habitat along waterways may disrupt normal movements and present barriers to dispersal. Increased vegetation control associated with water use efficiency programs results in increased frequency of disturbance of listed species and their habitats. If disturbance frequencies are greater than the recovery rate of the species and/or its habitat, declines in species numbers, reproduction, and distribution may occur. Non-target species, including listed species and their prey, may be killed or injured by use of herbicides and pesticides. Increased use of herbicides and pesticides contributes to bioaccumulation of contaminants throughout the food chain. Use of herbicides and pesticides will contaminate wetlands or waterways and may result in impaired reproduction, foraging, and sheltering, and increased susceptibility to disease and predation. Grading and leveling of land to improve distribution uniformity of irrigation water may result in the loss of permanent and seasonal wetland habitats.

Many species depend to some extent on agricultural lands and the habitat that irrigation and drainage water provide. Due to loss of the majority of native wetland habitats in the Sacramento and San Joaquin Valleys, the federally threatened giant garter snake (*Thamnophis gigas*) is largely dependent on habitat associated with agricultural waterways. Water use efficiency programs could result in significant loss and degradation of giant garter snake habitat. Giant garter snakes use waterways and canals as habitat and as movement corridors but are highly dependent on and associated with vegetative cover for protection from predation and temperature extremes. Agricultural waterways now provide the only movement corridors between some populations of giant garter snakes, as well as the only movement corridors between protected habitat on state and federal wildlife refuges. Loss of habitat along waterways that may result from water use efficiency programs may lead to fragmentation of giant garter snake habitat, isolation of populations, loss of genetic exchange between populations, and potentially to local extinctions of small genetically isolated populations.

Indirect effects of agricultural and urban water conservation:

Agricultural and urban water conservation could indirectly result in conversion of native habitats to irrigated agriculture, or conversion of agricultural lands or native habitats to urban uses. Conversions could be facilitated by: use of groundwater augmented by conserved water via

recharge from the application of conserved water to agricultural land; use of tail water produced from application of conserved water to agricultural land, and use of recycled water on agricultural land produced from application of conserved water to municipal and industrial development. Loss of upland, riparian and wetland habitats may be expected as a result of conversions made possible by increased water availability.

Conversion of habitats may result in: loss of upland refugia near aquatic habitats; altered migration and dispersal patterns of animals; reduced likelihood of seed dispersal across agricultural fields; reduced survival in degraded habitats within and around agricultural operations; reduced water quality; lack of reproductive areas; reduced forage; increased mortality from operations such as mowing and harvesting; and interference with vital behaviors. Additional impacts that will result from conversion to residential use include: increased direct mortality; predation by pets; competitive interactions with domestic animals, and; interruption of vital behaviors through increased light, noise, and increased contact with humans and domestic animals.

The conversion of native habitats to agricultural lands indirectly caused by increased water availability acquired through conservation measures; can increase the acreage of agricultural lands to which insecticides, herbicides, and rodenticides are applied. This can adversely affect listed species by: direct mortality; secondary poisoning of predators and scavengers; degradation of habitat quality following herbicide application; loss of prey base after pesticide application; reduced water quality; impacting native habitat through pesticide and herbicide drift; and loss of pollinators. Conversion of natural habitats and agricultural lands to residential/industrial use will produce similar effects. If an increase in available water allows conversion to irrigated agriculture in areas of poorly drained soils an increase in the effects from agricultural drainwater contamination may be expected, as described above.

Implementation of water efficiency measures may eventually lead to reduced diversions. Fish entrainment may decrease as a result of reduced pumping and diversions. A net reduced demand for water could allow more flexibility in timing, such that diversions could be reduced to minimize entrainment of fish during critical life stages. Water use efficiency programs could also make more water available for instream flows, and improve management of water for managed wetlands. Reduction in agricultural and urban runoff may improve water quality in the Delta and its tributaries and subsequently decrease the effects of contaminants on listed species and their habitats. Improved water efficiency may also reduce the need for other storage and conveyance projects, and thereby avoid the potentially large environmental effects of implementing those programs.

Site-specific information is needed for future implementation of specific measures under the WUE Program, so these actions are not covered by this opinion. However, the following measures are expected to minimize the effects of the WUE Program: project level environmental documentation and review; coordination with the Water Quality Program; coordination with ecosystem improvements; incorporation of techniques to restore, enhance, and protect ecosystem values; and implementation of MSCS measures to avoid, minimize, and compensate take of listed species. These measures, in addition to implementation and coordination with the ERP are expected to have a net benefit to ecosystems and listed species.

Water conservation projects could ultimately lead to the listing of species and could reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the conservation actions described in the **Description of the Proposed Action** will be fully implemented, including, but not limited to, the ERP, the Watershed Program, and the MSCS; CALFED agencies will request adequate funding for the conservation programs as necessary to implement this biological opinion; adaptive management will be used to assess projects and programs and if found to interfere with recovery, the project or program will be modified or terminated; CALFED agencies will work closely with water users, providing them with maps of listed species habitats within their Service areas and guiding them through the consultation process to address site-specific effects; CALFED Agencies will encourage the completion of HCPs encompassing the affected areas; implementation of, and conformance with, all recovery plans will be an integral part of all site-specific consultations; the CALFED Agencies will closely coordinate with the Service during development and implementation of all O&M Plans and Resource Management Plans; any site-specific effects to listed species will be consulted upon, as appropriate, following site-specific analysis and prior to the effect, and the Service and the CALFED Agencies are adequately funded and staffed to complete tiered site-specific consultations from this opinion and track implementation of conservation actions.

Water Transfer Program

The Water Transfer Program proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a Statewide water transfer market. Water transfers may encourage a more efficient use of water. For example, a water transfer based on the temporary fallowing of a particular field may produce revenue that could be used to improve the irrigation systems on that same field when it is brought back into production. The water that is no longer required for irrigation, when the field is fallowed, may be transferred for beneficial use elsewhere. Additionally, water transfers can provide benefits to the ecosystem by establishing a mechanism to 1) move water assets into and out of an EWA, once created, 2) move water from storage facilities (surface or groundwater) to provide in-stream

flows for the environment beyond the minimum requirement as well as provide salinity variability and reduced entrainment and impingement impacts associated with reduced or rescheduled diversions, and 3) provide water quality benefits by augmenting existing in-stream flows during agricultural return flow practices.

However, water transfers can also cause adverse effects to the environment primarily through changes to riverine flow and export. If transfers between agricultural and urban uses are timed differently from “usual” operation or out-of-basin transfers are made, water may not be available for use by fish and wildlife during key feeding or breeding times. This could also result in reduced habitat abundance attributable to reduced flow effects and/or reduced transport and attraction in response to reduced flow effects. Increased entrainment attributable to flow effects on species movement and distribution could also occur. Ground water transfers, or surface water transfers based on groundwater substitution, could result in land subsidence, degradation of groundwater quality, or impacts on vegetation dependent on groundwater.

Decline of habitats and species numbers is expected to continue if water transfers are made without regard to species needs. Degradation of listed species habitats and lack of recovery of affected listed species is expected to result if this consideration is not taken into account..

Poorly-timed water transfers could ultimately lead to the listing of many species and could reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the conservation actions described in the **Description of the Proposed Action** will be fully implemented, including, but not limited to, the EWA, the ERP, the Watershed Program, and the MSCS; agencies will request adequate funding for the conservation programs as necessary to implement this biological opinion; adaptive management will be used to assess projects and programs and if found to interfere with recovery, the project or program will be modified or terminated; the CALFED Agencies will closely coordinate with the Service during water transfer planning, any site-specific effects to listed species will be consulted upon following site-specific analysis and prior to the effect. The magnitude of transfers not addressed in the OCAP review and resulting from CALFED Program actions will be fully analyzed and addressed under section 7 or section 10 of the ESA, as appropriate.

Watershed Program

The Watershed Program would encompass the entire geographic extent of the CALFED Program. Any actions funded or otherwise guided by the Watershed Program through technical or financial assistance and coordination may impact any of California’s biological communities

(Table 1). Actions implemented in association with the Watershed Program has the potential to affect numerous species of animals and plants throughout the geographic area of the CALFED Program, including those evaluated under the MSCS.

If implemented correctly, the Watershed Program may result in minimal adverse effects to fish, wildlife, and plant species. An effective Watershed Program may ultimately be largely beneficial to biotic communities throughout the State of California by funding and providing technical assistance and coordination to promote positive actions and planning efforts within local watersheds to restore and maintain the health and integrity of ecosystems. An effective Watershed Program could minimize habitat fragmentation by supporting carefully designed land-use planning within watersheds. High water quality within watersheds could be another beneficial result of an effective Watershed Program. Restoration projects funded, or otherwise guided, through an effective Watershed Program could provide net benefits to local watersheds and their associated ecosystems. Habitat connectivity could be restored by restoration efforts throughout a watershed, thereby reducing habitat fragmentation and improving ecosystem integrity. An effective watershed program would be largely beneficial to the environment as a whole, though some direct adverse effects, however temporary, would likely result with the implementation of the Watershed Program. Foraging, reproduction, and dispersal of wildlife species inhabiting local watersheds could be disrupted by various watershed projects.

Watershed restoration projects would be largely beneficial in restoring habitat, dispersal corridors, and overall ecosystem function. However, direct adverse effects may be a temporary result of restoration activities. Foraging, reproduction, and dispersal could be disrupted by temporary disturbances like excessive noise during restoration activities (e.g., operation of heavy equipment), alteration of streambed, bank, and floodplain habitat to facilitate restoration, and frequent visual, auditory, and physical disturbances caused by vehicular and human traffic to, from, around, and within restoration areas. Individual species may be harmed or killed by the same disturbances mentioned previously.

Restoration projects within stream channels and adjacent corridors may temporarily result in increased inputs of sediments due to earth moving activities associated with restoration efforts. Aquatic or semi-aquatic species inhabiting stream reaches where sediment loads are increased may experience reproductive failure; siltation/sedimentation could lead to mortality of eggs/larvae of certain species (e.g., California red-legged frog, foothill yellow-legged frog, salmonid fishes, aquatic invertebrates) through suffocation.

Any temporary increases in sediment loads below restoration areas where earth moving activity has occurred may also reduce populations of organisms at the base of the food web, thereby

affecting food availability for primary and higher order consumers utilizing the stream and associated riparian corridor. A reduced availability of food locally may adversely affect the overall fitness of fish and wildlife species, if only temporarily.

Water Management Strategy

Storage

CALFED is currently considering twelve separate surface water storage projects. These actions, especially new surface storage reservoirs, would result in losses of various habitat types. Habitat loss, alteration, and fragmentation caused by surface storage actions throughout the geographic area of the CALFED Program would likely adversely affect species of animals and plants, including those evaluated under the MSCS.

New reservoirs would transform biotic communities within watersheds, both downstream and upstream of dams. Streams that were once naturally/historically intermittent (dry for part of the year) are converted to perennial streams below dams which eliminates species adapted to an intermittent hydrological regime. New reservoirs also typically introduce both native and non-native species into watersheds where they did not occur previously. Introductions of non-native species (e.g., bullfrogs, centrarchid fishes, ictalurid fishes, salmonid fishes) can have catastrophic effects on local populations of native species due to competition, predation, or introduced diseases.

Expanding the capacity of existing reservoirs results in additional loss of natural habitat upstream of dams, increases fragmentation of habitat, and increases the extent of impassable barriers to movement and dispersal of native land-dwelling species not capable of flight. Even species capable of swimming (e.g., many invertebrates, reptiles, amphibians, and some mammals) are usually incapable of crossing large bodies of water (i.e., reservoirs). The presence of non-native predators found in most, if not all, reservoirs only adds to the effectiveness of reservoirs as barriers to movement and dispersal. Ultimately, habitat fragmentation and the introduction of non-native species can create barriers to gene flow which can threaten the long-term viability of local populations of native species of both animals and plants.

New reservoirs, and at least some reservoir enlargements, would be accompanied by the installation of conveyance conduits to facilitate water transfers. The construction of conveyance structures would lead to additional losses, alterations, and fragmentation of habitat. Conveyance structures, particularly open-water canals, constitute impassable barriers to movement and dispersal for the vast majority of species incapable of flight. The potential effects of conveyance

structures are discussed in the effects section addressing the Conveyance element of the CALFED Program.

Ultimately, new and expanded surface water storage facilities could result in significant increases in both the rate and extent of growth/development throughout localities/regions benefitting from an effective increase in water supply.

In addition, reoperation of existing hydropower facilities for the primary purpose of water supply could result in changes in the timing and magnitude of flows downstream of the facilities. Thus, effects associated with new or expanded surface reservoirs also apply to these facilities. In addition, effects associated with any changed service areas may include land conversions (as described earlier in the document), including in modifications to the area of origin.

Specific effects of five of the twelve actions currently under consideration by CALFED Agencies, Los Vaqueros Reservoir Enlargement, Shasta Reservoir Enlargement, Millerton Reservoir Enlargement, Sites Reservoir, and Delta Wetlands (new reservoirs), are discussed qualitatively below. Because project-specific information is unavailable to quantitatively evaluate the effects of these actions, project-specific section 7 consultation is required for all storage projects and their associated effects.

A) Los Vaqueros Reservoir Enlargement (Contra Costa County)

Los Vaqueros Reservoir, an off-stream reservoir with a storage capacity of 100 TAF, may be enlarged by up to 400 TAF. An expanded Los Vaqueros Reservoir could result in the loss of as much as 3,340 acres of grasslands, woodlands, and riparian habitat, including mitigation land associated with the reservoir which was established to minimize adverse effects to the California red-legged frog (*Rana aurora draytonii*), San Joaquin kit fox (*Vulpes macrotis mutica*), and Alameda whipsnake (*Masticophis lateralis euryxanthus*). The potential effects of expansion of Los Vaqueros Reservoir are currently being evaluated. Concerns regarding expansion of this reservoir include: (a) expansion could threaten the viability of the local population of California red-legged frogs that depend on the mitigation area and remaining habitat around the reservoir for survival; (b) viability of San Joaquin kit foxes (*Vulpes macrotis mutica*) could also be threatened by an expanded Los Vaqueros Reservoir due to additional habitat loss and fragmentation, and potential elimination of a corridor between the northern and southern kit fox range; (c) enlargement of Los Vaqueros could result in impacts to other species as well, including those evaluated under the MSCS [e.g., California tiger salamander (*Ambystoma tigrinum californiense*)].

An enlargement of Los Vaqueros Reservoir may be followed by proposals for interconnections (conveyances) between Los Vaqueros and Mokelumne River, Hetch Hetchy Reservoir, or South Bay Aqueducts to store and distribute water from a variety of sources throughout the Bay Area. Reservoir interconnections would require new conveyance structures, which would result in multiple effects along and adjacent to conveyance corridors. As described above, installation of conveyance structures leads to loss, alteration, and fragmentation of all habitats traversed by the conveyance structures. Conveyance structures can be impassable barriers to movement and dispersal of both plant and animal species, including threatened and endangered species and those evaluated under the MSCS [e.g., San Joaquin kit fox and Alameda]. Ultimately, barriers to dispersal can inhibit gene flow within and between populations of plants and animals, which can be detrimental to the long-term viability of affected populations.

B) Shasta Reservoir Enlargement (Shasta County)

By raising Shasta Dam by as much as 6.5 feet in elevation (an approximate 300 TAF increase in storage capacity), at least 2,000 acres of habitat would be lost due to inundation. A portion of the McCloud River (protected under California State law) would be lost. All species inhabiting the 2,000 acres of habitat would be displaced, thereby intensifying inter-specific and intra-specific competition for resources locally. Mountain yellow-legged frogs (*Rana boylei*), and possibly tailed frogs (*Ascaphus truei*) could be directly affected due to habitat loss. Frogs upstream of the expanded reservoir could be adversely affected by non-native species (e.g., bullfrogs). Other animal and plant species may also be adversely affected by an enlarged reservoir due to habitat loss and fragmentation. Any enlargement of Shasta Reservoir would likely reduce the abundance and distribution of the Shasta sideband snail (*Monadenia troglodytes*), Shasta clarkia (*Clarkia borealis* spp. *arida*), and Shasta snow-wreath (*Neviusia cliftonii*).

When used to augment flows in the lower Sacramento River in the appropriate seasons, water stored in Shasta Reservoir may benefit aquatic species downstream (e.g., threatened and endangered fishes). An expanded Shasta Reservoir could also provide additional water for such environmental purposes.

C) Millerton Reservoir Enlargement

Millerton Reservoir, located on the San Joaquin River near Fresno, California, may be enlarged to a capacity of 1,240 TAF. An enlarged Millerton Reservoir may improve water-supply reliability and enhance flexibility to maintain instream flows and water quality in the San Joaquin River downstream of Friant Dam. The proposed enlargement may also improve the ability to manage San Joaquin Valley conjunctive use operations, regional water transfers, and flood control.

Approximately 3,500 acres of natural habitat would be lost as a result of reservoir enlargement. Numerous plant and animal species could be affected by an enlargement of Millerton Reservoir, including those evaluated under the MSCS.

D) Sites Reservoir

The establishment of the proposed Sites Reservoir, a new off-stream storage reservoir with a proposed storage capacity of 1.8 MAF, would result in the loss of at least 900 acres of oak-woodland and 70 acres of potential habitat for federally listed vernal pool crustaceans [i.e., vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardii*)]. In addition to impacts to vernal pool crustaceans, Sites Reservoir may negatively affect other species of animals and plants, including those evaluated under the MSCS [e.g., California Red-legged frog (*Rana aurora draytonii*), western spade-foot toad (*Schaphiopus hammondi*), California tiger salamander (*Ambystoma tigrinum californiense*), and adobe lily (*Fritillaria pluriflora*)].

As stated above, new reservoirs can completely transform biotic communities within watersheds, both below and above dams. Streams that were once naturally/historically intermittent (dry for part of the year) are typically converted to perennial streams below dams (through surface or ground water input) which eliminates species adapted to an intermittent hydrological regime. New reservoirs also can introduce both native and non-native species into watersheds where they did not occur previously. Introductions of non-native species (e.g., bullfrogs, centrarchid fishes, ictalurid fishes, salmonid fishes) can have catastrophic effects on local populations of native species due to competition, predation, or introduced diseases.

The seven remaining off-stream reservoirs being considered have been deferred, but may be revisited in the future, beyond Stage 1 of the CALFED Program. Montgomery Reservoir will be evaluated as an off-stream reservoir alternative to the proposed Millerton Reservoir enlargement. Schoenfield and Thomes-Newville Reservoirs, and the proposed Colusa Reservoir Complex could be evaluated later as an alternatives to the proposed Sites Reservoir. Currently, information is inadequate at this time to conduct any meaningful analyses of effects for any of the deferred reservoir projects mentioned above. However, the general effects for new surface reservoirs described above would be expected to result from any of these projects, should they be implemented in the future. Although the proposed Ingram Canyon Reservoir is to be deferred as well, an initial effects analysis specific to the proposed Ingram Canyon Reservoir is provided below.

Although deferred from Stage 1 of the CALFED Program, CALFED Agencies are conducting estimates of costs, benefits, and impacts of the proposed Ingram Canyon Reservoir. This new

reservoir, if approved, would be located south of the Delta in Ingram Canyon, Stanislaus County (approximately two miles west of the California Aqueduct and 32 miles south of Banks Pumping Plant). The proposed Ingram Canyon Reservoir would have a holding capacity of 820 TAF, and would function similarly to the existing San Luis Reservoir to add flexibility to Delta export operations under optimal biological and water quality conditions.

At least 3,500 acres of grassland, oak savanna, oak woodland, and chaparral habitat would be lost. In addition, at least 5 miles of intermittent stream would be lost due to inundation. All species of plants and animals living within the 3,500 acres to be inundated and intermittent stream would be adversely impacted by the proposed Ingram Canyon Reservoir, including those species evaluated under the MSCS [e.g., California red-legged frog, California tiger salamander, western spadefoot toad (*Scaphiopus hammondi*)]. The long-term viability of the San Joaquin kit fox could be threatened by the proposed reservoir through direct habitat loss, habitat fragmentation, and by the occlusion of an essential dispersal corridor maintaining gene flow between fox populations to the north and south of the proposed reservoir site.

F) Delta Wetlands

The Delta Wetlands proposal consists of converting two Delta islands comprising 11,000 acres, Webb Tract and Bacon Island, into surface storage facilities (reservoirs) and restoring two islands, Bouldin Island and Holland Tract, comprising roughly 9,000 acres to natural habitat. Together the two new reservoirs would provide approximately 250 TAF of water storage capacity. These new reservoirs are expected to improve flexibility in managing Delta fishes and water quality problems. Any modifications to the project description for this facility as described in our current biological opinion (File 1-1-97-F-76, May 6, 1997) would require revised consultation under section 7 of the ESA.

Restoring 9,000 acres across two Delta islands to natural habitat would likely benefit some plant and animal species living in the Delta that require natural riparian woodland and other natural habitat types for survival. The proposed reservoirs may provide habitat for migrating and some resident waterfowl.

However, the potential quality of water stored over peat soils underlying Delta islands has not been evaluated sufficiently. Conditions may arise in the proposed reservoirs, once constructed and filled, where microbial decomposition of the peat soils comprising the reservoir bottoms could result in highly nutrient-rich reservoir water. This nutrient rich water would not be appropriate for municipal uses. Furthermore, such nutrient rich water may be potentially detrimental if used to supplement Delta flows, since nutrient rich water could significantly increase the biological

oxygen demand where added to the Delta, thereby resulting in anoxic conditions within the water column. Anoxia within the water column can adversely affect and kill any aquatic organisms which respire aerobically.

G) Groundwater Conjunctive Use and Groundwater Storage

The CALFED Program has currently identified/proposed a target groundwater storage capacity of 500 TAF to one MAF south of the Delta to be implemented during Stage 1. The CALFED is currently evaluating the potential of groundwater conjunctive use/groundwater banking projects in all major groundwater basins within the CALFED solution area. Although the proposed groundwater conjunctive use/storage program has the potential to impart beneficial effects on the environment and plant and animal species within the geographic area of the CALFED Program, adverse effects also may occur.

Groundwater aquifers have the potential to be augmented with out-of-basin water with likely effects occurring within the watershed of origin. Donor streams may experience reduced flows due to water being siphoned off to distant aquifers in other watersheds. Reduced flows in streams can have effects on water quality, water temperature, riparian vegetation, and instream habitat. All species of plants and animals that utilize the affected riparian corridor for all or part of their lives may be adversely impacted by reduced stream flows. In addition, diverting water from a donor stream/watershed results in a net loss of water from the local watershed and groundwater aquifer. This net loss of water must be replaced by precipitation and, potentially, acquisition of water from distant donor streams/watersheds/aquifers.

Conveyance

The CALFED Program strategy is to develop a through-Delta conveyance alternative based on existing Delta configuration with some modifications, evaluate its effectiveness, and add additional conveyance and/or water management actions if necessary. The modifications to the existing Delta configuration will occur in both the south and north Delta. Specific effects of the through-Delta conveyance alternative under consideration by CALFED Agencies, is discussed qualitatively in the following sections. Because project-specific information is unavailable to quantitatively evaluate the effects of these actions, project-specific section 7 consultation is required for all CALFED conveyance projects and their associated effects.

The south Delta improvements proposed as part of the “Conveyance Program”, excluding the ecosystem restoration components, have been considered in previous biological opinions by the Service (1-1-96-F-53 and 1-1-97-F-184). The draft biological opinion issued by the Service

concluded that the previously proposed Interim South Delta Program would jeopardize the continued existence of the delta smelt and the Sacramento splittail and destroy or adversely modify delta smelt critical habitat. The determination was based upon the project as it was described, and was as follows.

The Service reached the conclusion that reproduction, numbers, and distribution of listed species would be adversely affected by: increasing entrainment of all life stages of listed fish species through un-screened agricultural diversions in the south Delta and through the currently unscreened or newly constructed unscreened intake structures at Clifton Court Forebay as maximum pumping rates in the south Delta are incrementally increased from current limits up to 8,500 cfs initially, and ultimately up to 10,300 cfs; flows toward the south Delta are facilitated through the dredging of Old River to increase its cross-section; and inflow into Clifton Court Forebay is increased. These actions have the effect of increasing the indirect effects of predation upon completion of the new intake structure; and decreasing spawning and rearing habitat as construction modifies the Delta.

The Service reached the conclusion that implementation of approved recovery plan tasks aimed at enhancing aquatic habitat, reducing entrainment losses at water diversions, reducing in-channel dredging, reducing contaminant loading, reducing the effects of introduced species, and reducing the use of traditional levee maintenance practices would be precluded.

The Service reached the conclusion that the constituent elements of delta smelt critical habitat would be adversely modified or destroyed by: adversely affecting over five miles of the physical habitat essential to the species, increasing contaminant loading in Old River through dredging, modifying Delta hydrology and river flow, increasing water velocities, modifying salinities in the form of incremental upstream shifts in X2 placement, and indirectly affecting water quality in the San Joaquin River. These modifications to the constituent elements of delta smelt critical habitat would adversely affect adult migration and spawning, larval and juvenile transport, and rearing.

After these biological opinions were drafted, the CALFED Agencies defined actions that could be taken to improve overall ecosystem health in the south Delta while allowing south Delta facility improvements to move forward. This resulted in a series of proposed actions to improve and elevate the environmental baseline for listed species and move them toward recovery.

These proposed actions include: 1) regional ERP actions, 2) consolidation and screening of agricultural diversions, 3) implementation of the VAMP with subsequent export and flow targets, 4) construction and evaluation of a 500 cubic feet per second (cfs) test facility at the Tracy Pumping Plant to develop best available technology for fish screening and salvage for the intakes

to the SWP and CVP export facilities, 5) construction of a new screened intake for Clifton Court Forebay for the full export capacity of the SWP (10,300 cfs), 6) evaluation of the need to retain a separate CVP intake facility with interties to the SWP or to consolidate with the SWP facility, 7) increase SWP pumping by 500 cfs from July through September so exports could be reduced during the preceding February through June period, 8) formation of a Barrier Operations Coordination Team to operate the barriers, 9) implementation of mitigation actions to off-set the direct and indirect project effects, and 10) implementation of the Environmental Water Account.

The proposed North Delta Improvements are designed to address flood control, water quality, fish, and water supply reliability. Actions include modification of the Delta Cross Channel gates, channel dredging and/or setback levees in the Mokelumne River, and the creation of additional floodplain, wildlife, and fish habitat. Under the Preferred Program, north Delta improvements also include the study and evaluation of a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs. This diversion facility between the Sacramento and Mokelumne rivers would likely include a fish screen, pumps, and facilities for upstream fish passage.

Under the Preferred Program Alternative, the DCC may be closed from September through July and possibly all months, which could increase delta smelt and splittail survival during January through July compared to DCC operation at the present. However, the additional closure of the DCC relative to present operation may increase the frequency and magnitude of net reverse flow conditions in the lower San Joaquin River.

Construction and operation of a screened diversion facility on the Sacramento River may be pursued during Stage 1 if the evaluations demonstrate that this facility is necessary to address drinking water quality concerns and it can be constructed without adversely affecting fish populations. The fish screens would be designed to prevent adult fish from leaving the Sacramento River and entering the new channel with the flow diverted into the Mokelumne River. Although the fish screen facility would mitigate potential entrainment impacts, other potential adverse effects would have to be addressed prior to constructing this diversion. Existing relationships indicate that reduced flow in the Sacramento River (from flow exiting through the diversion) would cause an increase in the proportion of flow entering Georgiana Slough. USFWS studies indicate that the survival of fish following the Sacramento River route toward Rio Vista may be several times higher than survival of fish entering the DCC and Georgiana Slough. The actual magnitude of survival, however, is uncertain and depends on other factors, including water temperature and flow or salinity. In addition, abrasion, increased predation, impingement on fish screens or other diversion structures, stress from being handled, and movement to inappropriate habitat would reduce the survival of fish contacting the fish screens.

The diversion of additional Sacramento River water into the Mokelumne River channels and the central Delta would increase the frequency and magnitude of natural channel net flow direction in the Lower San Joaquin River, but reduce the magnitude of natural net channel flow in the Sacramento River below the diversion, primarily during February to June. Natural net flow conditions in the Lower San Joaquin River channel could increase productivity, enhance species movement, and reduce entrainment in Delta diversions. The effects of reduced flow in the Sacramento River below the diversion could adversely affect habitat

Dredging to enlarge the Mokelumne River would increase the channel depth and further alter the natural structural features. In the short term, dredging would remove benthic communities and mobilize fine sediments. Maintenance dredging may be required over the long term, resulting in periodic short-term impacts. Dredging also may cause levee instability, which could require additional revetment and levee maintenance activities. Impacts to native fish may be avoided or minimized through the use of accepted construction time windows and best management practices (see *Levee System Integrity Program*). These activities would require further consultation with appropriate fishery agencies. If channel enlargement is the result of setting back existing levees, fish habitat would potentially be increased. Installation of setback levees will be completed in coordination with the ERP (see *Summary of Key Planned Actions* and *Ecosystem Restoration Program*).

Implementing operational changes to the Delta Cross Channel has the potential to benefit native fish migration by keeping species in the main stem Sacramento River thus allowing them to reach preferred habitat areas. Resolving local flood concerns through levee setbacks has the potential to create additional riparian habitats and tidal wetlands thus allowing increased spawning, rearing and refugia habitats for target species. Improving existing levees and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system, may also increase essential species habitat if soft fixes are used and work is performed within specified work windows.

Through increase in conveyance capability and modification of Delta hydrodynamics, decline of habitats and species numbers is expected to continue if north and south Delta improvements are made without regard to species needs. Degradation of listed species habitats and lack of recovery of affected listed species is expected to result if this consideration is not taken into account.

North and south Delta facility improvements examined in isolation could reasonably be expected to reduce the likelihood of survival and recovery of listed and proposed species. However, this should not be the case given the assumptions that: the conservation actions described in the Description of Proposed Actions will be fully implemented, including, but not limited to, the ERP,

the EWA, the Watershed Program, and the MSCS; CALFED Agencies will receive adequate funding for the conservation programs as necessary to implement this biological opinion; adaptive management will be used to assess projects and programs and if found to interfere with recovery, the project or program will be modified or terminated; the CALFED Agencies will closely coordinate with the Service during water transfers; and, project-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect.

Additionally, the U.S. Fish and Wildlife Service assumes that the beneficial environmental actions will be implemented ahead of the south Delta facility improvements. The milestones included within this document are integral to successful implementation of beneficial actions. The Service understands that not all beneficial environmental actions will be implemented prior to all facility actions coming on line, but assumes that enough beneficial environmental actions will be implemented to raise the environmental baseline before facility actions become operational.

Environmental Water Account

The EWA is designed to provide fishery benefits without additional adverse effects on water deliveries to south-of-Delta contractors. The EWA supplements the existing environmental baseline (1995 Water Quality Control Plan; biological opinions for delta smelt, splittail, and winter-run chinook salmon, CVPIA sources of water including 800,000 acre-feet of (b)(2)). It can augment instream flows, delta outflows and hydrodynamics, and export curtailments to enhance environmental conditions or reduce take at key times of fishery concern. Benefits would be provided to all anadromous and native fishes which use the Delta and its watershed.

Part of the purpose of the EWA is to provide export reductions which would (a) reduce take or enhance environmental conditions, (b) minimize adverse effects of project operations at the State and Federal export facilities, and (c) enhance conditions for fish. The EWA provides an alternative to prescriptive standards that would be applied during periods of exceeding incidental take. The ability of the EWA to provide for additional fishery benefits over the pre-CALFED Program environmental baseline will depend upon the degree to which it must be used to reduce take. Implementation of the EWA will provide a benefit to fish. Tier 3 assets are assumed to be available and will be obtained to reduce take for fish when needed and as described below.

The EWA works on a principle of “no harm” to south of Delta deliveries, which means that the EWA essentially changes the *timing* of exports but does not change the overall magnitude or timing of deliveries.

The EWA is currently designed to be implemented for four years. The program may be continued if the benefits for fish occur and an evaluation of the sufficiency of assets is determined to be adequate. If new water storage and conveyance projects come online, additional fishery impacts are likely to occur through modification of the timing and quantities of water passing through the Delta watershed. To offset potential impacts and to provide for recovery of fish populations, additional operational rules will need to be developed which would allow for protection of fish. These operational rules may include either (a) new standards which limit the timing and magnitude of exports and water supply releases at key periods of concern for fish, (b) new sharing formulae to increase EWA assets, which would allow the EWA to offset impacts and implement restoration actions, or (c) a combination of the two.

If the EWA is not fully implemented, project operations will return to the regulatory baseline. In addition, the following clarifications are set forth: 1) CVP/SWP will implement both the flow and export provisions of either VAMP or, in the absence of VAMP, the flows and export curtailments in the 1995 biological opinion on OCAP; 2) if or when the yellow light level in the incidental take statement is reached, as identified in the 1995 OCAP biological opinion, the CVP/SWP will immediately reinitiate consultation and implement actions to reduce the amount or extent of take and reduce the indirect effects of project operations on fish as deemed necessary by the fishery resource agencies; 3) all new projects which may affect the environmental baseline identified in this opinion and the 1995 OCAP opinion will be subject to section 7 consultation to avoid and/or minimize the affects of those actions; and 4) other necessary regulatory provisions which may be required to meet the needs of listed species.

Science Program

The Science Program will largely benefit listed species through implementation of the CMARP. CMARP will support monitoring and research presently not available for many species and their habitats, and will monitor implementation and progress of other CALFED Programs. Through monitoring, research, and assessment of species and program implementation, CMARP is expected to contribute information and recommendations to CALFED Agencies and stakeholders in support of the adaptive management process. Information developed by the Science Program will contribute to the recovery of listed and proposed species.

The Science Program is likely to result in capture, harassment, injury, death, and collection of listed species. These effects will occur during monitoring as part of implementing other CALFED Programs, during baseline monitoring of species populations, and as a part of conducting research projects. The potential effects of Science Program activities will be avoided and minimized by authorizing only qualified biologists to capture and handle listed species while conducting monitoring and research. To achieve this, these activities will be authorized only through the Section 10(a)(1)(A) Recovery Permitting process, or through subsequent, tiered, section 7 biological opinions, which will incorporate the same standards as the Recovery Permitting process.

Multi-Species Conservation Strategy

The MSCS encompasses all CALFED Program elements and strategies and is the guiding document for species conservation throughout Phase III. Its implementation is expected to greatly benefit listed, proposed, and other species. In the MSCS, delta smelt, Sacramento splittail, Lange's metalmark, valley elderberry longhorn beetle, Suisun thistle, soft bird's-beak, Contra Costa wallflower, and Antioch Dunes evening-primrose have been assigned the conservation goal of recovery ("R"); and the San Joaquin Valley woodrat, riparian brush rabbit, salt marsh harvest mouse, California clapper rail, least Bell's vireo, giant garter snake, Delta green ground beetle, and western yellow-billed cuckoo, have been assigned the conservation goal, "contribute to recovery ("r"). The MSCS also describes how goals will be achieved through species prescriptions, which describe the future expected changes in evaluated species' habitats and populations with full implementation of the CALFED Program. If evaluated species prescriptions are achieved, CALFED Program goals for evaluated species will have been met. The CALFED Program is expected to undertake all or most of the actions necessary to recover delta smelt, Sacramento splittail, Lange's metalmark, valley elderberry longhorn beetle, Suisun thistle, soft bird's-beak, Contra Costa wallflower, and Antioch Dunes evening-primrose. The CALFED Program is expected to undertake all or most of the actions in the MSCS focus area

necessary to contribute to the recovery of San Joaquin Valley woodrat, riparian brush rabbit, salt marsh harvest mouse, California clapper rail, least Bell's vireo, giant garter snake, Delta green ground beetle, and western yellow-billed cuckoo. For other listed and proposed species, the CALFED Program is expected to avoid, minimize, and compensate for the adverse effects of its actions.

The MSCS contains two types of conservation measures: (1) measures to avoid, minimize, and compensate for the adverse effects to evaluated species caused by individual CALFED Program actions, and (2) measures to enhance evaluated species that are not directly linked to CALFED's adverse effects, are consistent with the ERP, and may be milestones. Both types of measures will be implemented through the use of ASIPs that will be developed for specific CALFED Program actions or bundles of actions. The MSCS also allows for additional, project-specific conservation measures to be included in ASIPs. Thus, the MSCS will contribute to avoiding, minimizing, and compensating for adverse impacts to listed and proposed species associated with other CALFED Programs.

Implementation of the MSCS could adversely impact listed species through implementation of conservation requirements. Habitat disturbance and conversion could occur during ecosystem restoration actions (e.g., construction of tidal channels in existing tidal marshes, or conversion of diked, marshes to tidal marsh may temporarily impact salt marsh harvest mice but is ultimately expected to lead to recovery). In addition, individual animals could be harassed during construction, implementation of minimization measures such as capture and relocation of individuals, and capture and handling during monitoring. These types of effects will be avoided and minimized by incorporating measures in the MSCS into ASIPs developed to implement conservation actions.

Implementation Plan

Cumulative Effects

Cumulative effects are those effects of future State, local, or private actions on endangered and threatened species or critical habitat that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action (e.g., non-CALFED Agency projects such as Corps flood control projects, and USFS or BLM actions) are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Numerous non-Federal actions continue to eliminate habitat for listed and proposed threatened and endangered species in the Central Valley and Delta. Habitat loss and degradation affecting both animals and plants continues as a result of urbanization, oil and gas development, road and utility right-of-way management, flood control projects, overgrazing by livestock, and continuing agricultural expansion. Listed and proposed animal species are also affected by poisoning, shooting, increased predation associated with human development, and reduction of food resources. Continued growth and development are also likely effects. Cumulative effects associated with continued growth and development will likely adversely affect federally listed threatened and endangered species throughout the State of California.

In this section, a general description of the adverse impacts to habitats described in the Environmental Baseline section of this opinion are characterized. The habitat sections that follow describe in more detail how activities and events, many of which constitute non-Federal actions, are impacting listed species.

Cumulative Effects to Habitats

Delta Aquatic Habitats

Delta fishes continue to be adversely affected by entrainment, upstream or reverse flows of waters in the Delta and San Joaquin River, destruction of spawning and refugial areas, change in the hydrologic patterns in Delta waterways, and constriction of low salinity habitat to deep-water river channels of the interior Delta (Moyle et al. 1992). Reduced or reversed flows due to pumping can confuse migrating fishes and lengthen out-migration periods. Pumping activities can concentrate Delta fishes and their predators in small areas where predation risk is increased. Fish can be killed by impingement on screening facilities at high flow rates, entrained through pumping plants, and diverted into unsuitable habitat. Reduction in food supply due to water diversions can also cause increased mortality. Water diversions contributing to these cumulative effects include intakes serving non-Federal pumping plants, municipal and industrial uses, water for power plants, and numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay. Levee maintenance disturbs spawning and rearing habitat, and re-suspends contaminants into these waters.

Cumulative effects on the delta smelt and Sacramento splittail include any continuing or future non-Federal diversions of water that may entrain adult or larval fish or that may decrease outflows incrementally, thus shifting the position of these fish species preferred habitat upstream. Water diversions through intakes serving numerous small, private agricultural lands and duck clubs in the Delta, upstream of the Delta, and in Suisun Bay contribute to these cumulative effects. These

diversions also include municipal and industrial uses, as well as providing water for power plants. Delta smelt adults seek shallow, tidally influenced, fresh water (i.e., less than 2 ppt salinity) backwater sloughs and edgewaters for spawning. To assure egg hatching and larval viability, spawning areas also must provide suitable water quality (i.e., low concentrations of contaminants) and substrates for egg attachment (e.g., submerged tree roots, branches, emergent vegetation). Levee maintenance disturbs spawning and rearing habitat, and re-suspends contaminants into these waters.

The introduction and spread of non-native species may occur when the levees are breached or when separate creeks or river systems are reconnected. Several non-native species may adversely affect the delta smelt and splittail, including the Asian clam and three non-native species of euryhaline copepods. The Asian clam could potentially play an important role in affecting phytoplankton population dynamics. The non-native copepods may displace native species and at least one species of copepod (*Sinocalanus doerri*) is difficult for larval fishes to catch because of its fast swimming and effective escape response. Reduced feeding efficiency and ingestion rates weaken and slow the growth of young fish and make them more vulnerable to starvation and predation.

Other cumulative effects include: wave action in channels caused by boats that can degrade riparian and wetland habitat and erode banks; the dumping of domestic and industrial garbage, presenting hazards to the fish because they could become trapped in the debris, injure themselves, or ingest the debris; reduction of habitat, and introduction of pesticides and herbicides from the construction and operation of new and existing golf courses; oil and gas development and production remove habitat and may introduce pollutants into the Napa River; agricultural uses protected by levees reduce riparian and wetland habitats; residential or agricultural land use can fragment and reduce wildlife habitat and corridors; unscreened agricultural diversions throughout the delta divert all life stages of fish (Service 1996); and grazing activities may degrade or reduce suitable habitat.

Additional cumulative effects result from the impacts of point and non-point source chemical contaminant discharges. These contaminants include selenium and numerous pesticides and herbicides associated with discharges related to agricultural and urban activities. Implicated as potential sources of mortality for delta smelt and Sacramento splittail, these contaminants may adversely affect delta smelt and Sacramento splittail reproductive success and survival rates. Spawning habitat may also be affected if submersed aquatic plants used as substrates for egg attachment are lost due to toxic substances.

Salt Marsh Habitats

Pollution, over-exploitation of commercial fisheries, water diversions, and introduction of numerous non-native species continue to affect the ecology of San Francisco Bay tidal marshes. A number of factors influencing the remaining tidal marshes limit their habitat value. Much of the East Bay shoreline from San Leandro to Calaveras Point is rapidly eroding. Many marshes around South San Francisco Bay are undergoing vegetational changes because of land subsidence caused by groundwater pumping. In addition, an estimated 600 acres of former salt marsh along Coyote Creek, Alviso Slough, and Guadalupe Slough are currently dominated by fresh- and brackish-water vegetation due to continuing freshwater discharge from South Bay wastewater facilities and are thus of lower quality for California clapper rails and salt marsh harvest mice. In San Pablo and Suisun Bays, the average salinities are increased by upstream diversions by CALFED and DWR water projects. Intertidal and riparian marsh habitats used by species such as the California clapper rail, salt marsh harvest mouse, and Suisun thistle may be degraded or destroyed by a variety of development and maintenance activities conducted by private organizations, state agencies, or local governments.

Riparian Habitats

Factors contributing to the loss of riparian forest include: (1) continued conversion of non-irrigated land to agriculture; (2) levee construction and maintenance; (3) bank erosion; (4) grazing by livestock; (5) use of riprap for bank protection; (6) groundwater extraction; (7) flow regulation; and (8) the continuing development of land along the riparian corridor. Dams flood riparian vegetation in their impoundments and degrade it downstream by altering flows and geomorphic processes. Flood control interferes with natural processes that affect riparian forest regeneration. Controlled water release from dams reduces mid-successional habitat (dominated by brush and young to middle-aged trees). Unusually heavy or extended flooding of remnant riparian habitats can be detrimental to some terrestrial endangered species (e.g., riparian brush rabbits could drown or be isolated in small upland refugia where they would be more vulnerable to predation; giant garter snakes dormant in burrows could drown or be forced to seek new hibernacula).

Freshwater Wetland Habitats

These wetlands continue to be drained for agricultural and urban use. Some wetlands may also be inundated by reservoirs and converted to open water habitat. Conversion of natural habitats to agricultural and urban uses results in loss of marshes, sloughs, ponds, and small streams. Many of the remaining wetlands may be converted from seasonally to permanently inundated systems.

Habitat value of some man-made wetlands (rice fields, canals, reservoirs) is adversely affected by maintenance activities, pesticide use, and contaminant loading.

Vernal Pools

Activities that contribute to vernal pool habitat losses include plowing and deep-ripping for agriculture, energy development, urban development, flood control projects, highway and utility projects, and overgrazing (California Department of Fish and Game 1992; 58 **FR** 41700; 59 **FR** 48136). Limited distributional patterns increase the susceptibility of individual populations and entire species to severe declines from both natural and human-induced disturbances. Much of the remaining vernal pool habitat continues to be degraded by fragmentation, changes in hydrological patterns, off-road vehicle use, increased competition from non-native species, periodic drought, and miscellaneous human disturbances. In many areas, the cumulative effects of habitat loss, fragmentation, and degradation reduce the potential for remaining habitats to indefinitely sustain viable populations of rare species. Some vernal pool complexes are protected from disturbance, but the majority remain under pressure from development, and are threatened by activities such as agricultural and urban development, mosquito abatement, gravel mining, flood control and water conveyance projects, pipeline projects, reservoir construction, off-road vehicle use, intensive livestock grazing, refuse disposal, and other activities (59 **FR** 48136). Listed plant species endemic to vernal pool habitats are adapted to hydro-periods with winter inundation and summer drying, and are out-competed by marsh plants when hydrology is altered so standing water is permanently present.

Coastal and Inland Dune Habitats

Continued recreational use of beaches causes disturbance to nesting snowy plovers and least terns from pets, beachcombers, and off-road vehicles. Dune habitats on coastal beaches continue to be altered by the introduction of invasive dune-stabilizing vegetation (especially European beach grass (*Ammophila arenaria*) and ice-plant (*Carpobrotus edulis*). Non-native dune-stabilizing vegetation competes for space with native dune plants and stabilizes open sand faces needed by native dune plants.

Lagoon habitats are altered by upstream water diversions, dredging, and associated changes in salinity, pollution, and siltation. During drought periods, the lack of rainfall, combined with human induced water reductions (i.e., diversions of water from streams, excessive groundwater withdrawals), degrades lagoon ecosystems and creates extremely stressful conditions for most aquatic species. The introduced yellowfin goby (*Acanthogobius flavimanus*) may also compete with the tidewater goby in lagoon habitats.

Ongoing threats to listed species at the Antioch Dunes include competition from weedy species, disturbance from fuel break maintenance and people walking to the riverfront, and ecological changes resulting from severe reduction, fragmentation, and degradation of the dune ecosystem (U.S. Fish and Wildlife Service 1984).

Interior Grassland Habitats

Grassland losses have continued to result from urban expansion and conversion to irrigated croplands. Degradation of grassland quality also continues, especially on heavily grazed rangelands. Conversely, grasslands are also being created by conversion of other native habitats for grazing.

Alkali Scrub Habitats

Alkali scrub habitat continues to decline because of agricultural conversion, flood control, and groundwater pumping.

Oak Woodland Habitats

Continued habitat loss and decline results from clearing for livestock forage improvement, residential and commercial development, fuel-wood harvesting, agricultural conversion, and other activities. In many areas, remaining oak woodlands are declining due to lack of regeneration and survival of young trees. The reasons for the lack of stand regeneration in oaks are not well understood; however, competition with introduced grasses; fire suppression; and consumption of acorns and seedlings by livestock, rodents, and other wildlife have all been implicated (Mayer et al. 1986, Griffin 1977). Urban and agricultural development, rangeland improvement, fuel harvesting, and other activities continue to eliminate oak woodland habitats.

Coniferous and Mixed Forest Habitats

Continuing timber harvest creates large areas of early-successional clearcuts and even-aged young stands, reduces the structural complexity of forests, diminishes the availability of snags and deadwood habitat, increases the fragmentation of habitat with logging roads and clearcuts, and causes soil erosion into streams. Local areas of forest are severely affected by mining and the growth of urban areas.

Chaparral Habitats

Chaparral habitat continues to be converted to urban areas and agricultural land. In many areas deterioration of remaining habitat results from fire suppression, which leads to excess accumulations of woody material and unusually large and intense conflagrations when fires eventually occur (Hanes 1977). Lack of ground-cover subsequently facilitates flooding and runoff. In turn, this may produce silting of downstream aquatic habitats.

The species associated with gabbro soils are declining as a result of: habitat loss, fragmentation, and alteration of natural ecosystem processes caused by residential and commercial development; grading, road construction and maintenance; fire suppression; herbicide use; unauthorized dumping; mining; and other activities (59 **FR** 18774).

Fifteen active surface mines on private land near Ione continue to remove Ione soils habitat; approved reclamation plans show that in excess of 3,500 acres of surface removal will occur. Plants on Ione soils are also threatened by disease, clearing of vegetation for irrigated/cultivated agriculture and fire protection, habitat fragmentation, residential and commercial development, changes in fire frequency, and ongoing erosion.

Sierra and Coastal serpentine habitats are being reduced and degraded by urbanization. Species on serpentine soils are also adversely affected by firebreak construction, agricultural land conversion, livestock grazing, trash dumping, off-road vehicle use, recreational gold mining, and trampling by hikers.

Coastal Scrub and Coastal Grassland Habitats

Four major factors contribute to changes in the distribution and composition of coastal prairies: the introduction of highly competitive, non-native species; an increase in grazing pressures; the elimination of annual fires; and cultivation (Heady et al. 1988). In addition, urban growth is increasingly causing fragmentation and restriction of coastal prairie and coastal scrub habitat. Threats to species on these habitats include loss of habitat to urbanization, road-kill fatalities, illegal collection, off-road vehicle use, unsuitable levels of livestock grazing, trampling of food plants by horses and hikers, use of insecticides, rock and sand quarrying, and invasive non-native species.

Ongoing threats to listed and proposed species on serpentine habitats in the Bay Area include urban growth (including residential developments, golf courses, road and highway construction, and waste disposal), recreational use of open space (resulting in erosion and facilitating growth of

weedy species), invasion by non-native plants, and ecological changes resulting from severe habitat reduction and fragmentation (57 **FR** 59053).

Threats to endemic species of Zayante sandhill habitats include destruction of habitat from residential development, recreational activities, equestrian use, agriculture, invasion by non-native vegetation, changes in fire cycles, and sand mining.

Instream Flow, Water Impoundments and Diversions

Hydrodynamic conditions in the Delta are tied to continuing and future hydraulic modifications in the Delta made for various beneficial purposes, such as levee construction for land reclamation and flood control; channel dredging, enlargement, and deepening for navigation and levee maintenance; installation and operation of diversion pumps, siphons, and drainage pumps; and construction of non-Federal export pumping plants and associated facilities for water management. Increased demands may further reduce reservoir storage and will adversely affect riverine conditions. Reduced availability will result from: (1) operations that reduce the frequency of spill from upstream reservoirs; (2) build out by senior water right holders who currently do not make full use of their entitlements; and (3) changes in the criteria that define surplus flows. Continued upstream impoundment and diversion of snowmelt will reduce the potential for high spring outflows. Because surplus flows combined with required flows in the Water Quality Control Plan are critical for transporting fish larvae to rearing habitat and maintaining that rearing habitat in a suitable location in Suisun Bay, new diversions of surplus water will reduce the likelihood that fisheries declines will be reversed. Variation in climate between years can also exacerbate the cumulative effects of water diversions. Drought conditions increase demand for water while reducing the total amount of water available for fish and wildlife, agricultural, municipal and industrial uses, and can thus result in additional shortfalls in instream flow and upstream movement of the 2 parts-per-thousand (ppt) isohaline (X2). Extremely high precipitation events can also adversely affect endangered species. Delta fishes can suffer increased mortality if they are carried out of their preferred estuarine habitats toward San Francisco Bay by high outflows.

Contaminants and Water Quality

Agricultural and industrial activity can introduce contaminants into water used by threatened and endangered species. These contaminants may include selenium, arsenic, cadmium, chromium, copper, mercury, lead, nickel, silver, tributyltin, zinc, hydrocarbons, and organochlorines. Contaminants may enter surface waters through point source spills and discharges, urban and

agricultural runoff, deposition of atmospheric aerosols, and dredging that releases contaminants trapped in sediments.

The major source of water contamination in the Central Valley is agricultural drainwater, which has high salinity, high selenium concentrations (particularly in water draining selenium-rich soils in the San Joaquin Valley), and pesticides. Dumping of highly saline drainwater into rivers can have similar adverse effects on aquatic organisms.

Evaporation ponds which concentrate selenium-rich drainwater can attract wetland animals which may then die or suffer developmental abnormalities from selenium toxicity. Broadcast spray of malathion and other pesticides in agricultural areas can drift into non-target areas, kill plant pollinators, reduce insect prey species, and contaminate runoff. Pesticides cause death of the small invertebrates and zooplankton that support the food chain, and can be toxic to higher-level predators by bioaccumulating to increased concentrations. Eggs and larvae of aquatic organisms are particularly vulnerable to mortality or developmental abnormalities from pesticides. Levee maintenance and dredging resuspends contaminants trapped in sediments. Selenium, pesticides, and herbicides may adversely affect delta smelt and Sacramento splittail reproductive success and survival rates.

Spillage of wastewater from mining activity (particularly the Iron Mountain Mine) could potentially introduce large pulses of water laden with contaminants such as copper, zinc, and cadmium into Central Valley river systems and the Delta. Central Valley waters could also be contaminated by incidental leakage of gasoline and oil from vehicles and storage tanks, illegal dumping of waste oil and other chemical wastes, or accidental spills of chemicals or petroleum products from tank trucks or rail cars. Release of contaminated ballast in San Francisco Bay by ships further reduces water quality.

Non-native Species

Non-native species continue to spread and be introduced into aquatic habitats of the Delta and Central Valley rivers. Releases of ballast water from ships or deliberate stocking of fish introduce non-native species into water bodies. Non-native euryhaline clams reduce the abundance of phytoplankton. (Euryhaline species are able to live in water with widely varying salinity.) Non-native diatoms growing in chains are more difficult for zooplankton to graze upon. Introduced copepods are more difficult to catch than native copepod species and may thus reduce food availability for native fishes. Introduced silversides and gobies may prey on eggs and larvae of native fishes. Larval striped bass and other non-native fish may compete for food and space with native fishes. Delta smelt may hybridize with the introduced Japanese pond smelt. Introduction

of large predatory fish such as northern pike has the potential to greatly increase mortality of native fishes.

Introduced bullfrogs pose a great threat to a variety of aquatic species, including snakes, fish, and other frog species. Adult bullfrogs are accomplished predators which can populate an area quickly and out-compete, as well as prey upon, the natives.

Introduced plants have also caused problems for native species. Non-native plants compete with native plants for light, space, and nutrients. The lack of natural population controls for non-native (e.g., predators, disease) can allow these species to out-compete native species and form a monoculture of an introduced species. Species such as the Brazilian elodea (*Egeria densa*) and yellow star-thistle (*Centaurea solstitialis*) have taken over aquatic and terrestrial habitats (respectively) in California.

Native Habitat Conversion and Associated Activities

Terrestrial and wetland habitats used by threatened and endangered species continue to be modified or converted by private entities, State agencies, or local governments. The increase in urbanization and agricultural conversion increases fragmentation and degradation of remaining habitat.

The uses associated with land conversions that occur include: oil and gas development; mining or quarrying for sand, gravel, or minerals; liquid waste treatment plants; wind farms; pipeline installation; transmission line installation; creation of reservoirs or evaporation ponds; construction of roads or other transportation infrastructure; urban or industrial developments; or agricultural conversion. Land conversions can result in take of a wide variety of threatened or endangered animal species, including but not limited to giant garter snake, California red-legged frog, San Joaquin kit fox, blunt-nosed leopard lizard, valley elderberry longhorn beetle, and vernal pool crustaceans. Numerous threatened and endangered plants of vernal pool, wetland, grassland, serpentine, and alkali scrub habitats are also affected by ongoing habitat conversion. Areas of endemism where habitat conversion would have disproportionately large effect on listed species include: remnant vernal pool complexes and riparian habitats in the Sacramento and San Joaquin Valleys; alkali scrub/grassland habitats of the San Joaquin Valley and Carrizo Plain; the San Bruno Mountain and Milagra Ridge area of San Mateo County; the gabbro and serpentine soils of the Pine Hill intrusion in El Dorado County; the Antioch Dunes in Contra Costa County; the Zayante sand hills of the Santa Cruz Mountains; and the serpentine soils of the San Francisco Bay and Santa Clara Valley areas. Many of these areas are currently under great pressure to be developed for municipal and industrial uses.

Conversion of native land for agricultural uses, and conversion of agricultural lands from one use to another, continues to be the most critical threat to listed species. Although the increment of habitat loss attributable to urban development appears to be increasing, these activities remain less significant, for most species, than conversion of native habitats for irrigated/cultivated agriculture. Agricultural conversion is generally not subject to any environmental review; is not directly regulated and is only infrequently monitored. Conversion of privately owned habitat without use of federally supplied water or filling of wetlands typically does not result in section 7 consultation with the Service, nor is it usual for there to be an application for a section 10 incidental take permit. Illegal fill of wetlands without Corps permits has occurred in the past and is likely to continue. In addition, water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

The California Department of Forestry (1988) has predicted wildland habitat losses totaling 110,000 acres in the Sacramento Valley region and 465,000 acres in the San Joaquin Valley region between 1980 and 2010 as a result of agricultural conversion and urbanization. Much of the projected loss is likely to occur in the remaining blocks of habitat for listed and proposed species.

During habitat conversion threatened and endangered species could be killed or injured by operation of heavy equipment (crushing, burial by earthmoving equipment, discing, grading, mowing) or flooding of habitat. Listed species could be harassed during construction by noise, ground vibrations and compaction of burrows, construction lighting, and disruption of foraging and breeding behavior. Listed species not killed directly by operation of equipment would probably find themselves in sub-optimal habitat with a decreased carrying capacity due to lower availability of foraging and breeding habitat and greater vulnerability to predation. If listed species were displaced from converted lands into nearby native habitat, population densities would rise and intraspecific competition and predation pressure would be likely to increase. Animals that lose their fear of humans can become more vulnerable to shooting, poisoning, and roadkill. Habitat conversion also reduces the availability of suitable habitat for future recovery of species and isolates populations by increasing habitat fragmentation.

Some listed terrestrial species (e.g., bald eagle, San Joaquin kit fox, kangaroo rats, giant garter snake) are vulnerable to accidental or intentional unauthorized take by electrocution on electric fences or power lines, trapping, shooting, clubbing, or poisoning. Incidental disturbance from human activity may also cause disruption of normal foraging and reproductive activities. Listed plants may be threatened by vandalism or horticultural collecting. Listed butterflies can be threatened by unauthorized collecting by lepidopterists. These forms of unauthorized take are

likely to occur more frequently as the human population in the Central Valley increases and native habitat is fragmented and converted.

Vehicular traffic is an ongoing hazard that can cause roadkill mortality for a wide variety of terrestrial listed species (e.g., giant garter snake, blunt-nosed leopard lizard, San Joaquin kit fox, California red-legged frog). Traffic will be increased by construction of new roads and agricultural, industrial, and urban development. As barriers to dispersal, roads also reduce the probability that unoccupied habitat will be colonized by listed species. Roadside maintenance can affect listed plants by grading, mowing, erosion control, and spraying of herbicides.

Off-road vehicles can kill or injure listed plants and animals, as well as causing erosion, harassing animals with noise and ground vibrations, and crushing burrows used for shelter. Heavy pedestrian foot traffic can also compact soil and trample plants and small or dormant animals.

Rodent control measures can: reduce the availability of prey for listed predators (e.g., San Joaquin kit fox); injure or kill listed predators through secondary poisoning if poisoned rodents are eaten; injure or kill other listed species (e.g., Fresno, Tipton, and giant kangaroo rats, San Joaquin, or riparian, woodrat) that may eat rodenticide-treated baits; and reduce the availability of ground squirrel burrows as shelter and hibernation refugia for listed species (e.g., giant garter snake, San Francisco garter snake, kangaroo rats). Use of burrow fumigants on levees and other potential upland refugia can injure or kill listed species sheltering in ground squirrel burrows.

Urban and agricultural development results in increased abundance of domestic and feral cats and dogs, as well as wild predators (such as raccoons, red foxes, and skunks) that are attracted to trash dumping and suburban developments. This high abundance of predators can result in increased predation rates for small terrestrial vertebrates, including listed species (e.g., blunt-nosed leopard lizard, giant garter snake, California red-legged frog). Listed predatory species such as the San Joaquin kit fox may similarly suffer increased competition for space and food. Other indirect effects from urbanization include increased disturbance levels, ground slumping, garbage dumping, altered fire regimes, vandalism to protected habitats, increased foot traffic through protected areas, and unauthorized activities that adversely affect the survival of rare species.

Listed plant species can be buried or killed by dumping of trash, fill dirt, or garden debris. Dredging and clearing of vegetation from irrigation canals reduces foraging habitat and escape cover for giant garter snakes. Listed species in wetland habitats (including vernal pool crustaceans and eggs and tadpoles of California red-legged frogs) may be injured or killed by

mosquito abatement measures including pesticide application and predation by introduced mosquitofish.

Hydrological changes caused by development can include changes in the water table or increased runoff from up slope agricultural irrigation, residential development, or golf courses. Erosion and slumping of soils may result from changes in hydrology. These effects may change the suitability of habitat for listed plant species.

Transformation of watercourses and wetlands from seasonal to permanent hydroperiods by irrigation and damming alters the plant and animal communities, allowing colonization by bass, sunfish, bullfrogs and emergent marsh vegetation such as cattails and tule reeds. Tadpoles of California red-legged frogs typically metamorphose by late summer and are able to survive if wetlands dry in early autumn. Bullfrogs, which are larger and have a longer tadpole period, will competitively exclude California red-legged frogs in permanent water bodies. Bullfrogs, bass, and sunfish will also prey on California red-legged frog eggs and tadpoles.

Oil exploration poses a threat to many species as well. Construction of pads and roads associated with oil development, as well as the process of finding oil deposits can disturb large areas of habitat. Noise, vibration, traffic, and other human disturbances can also adversely affect species in the area.

Grazing and Land Management

Livestock grazing on State and private lands can cause erosion and degradation of riparian vegetation that provides habitat for listed species such as the valley elderberry longhorn beetle, southwestern willow flycatcher, riparian brush rabbit, and San Joaquin (riparian) woodrat. Livestock wallows may degrade seasonal wetlands that harbor listed species. Trampling can also collapse rodent burrows used as shelter by some listed species. Listed plant species can be adversely affected by overgrazing and trampling, which can reduce survival and reproductive output of plants. However, in some cases moderate levels of grazing may be beneficial to listed plants, or to species such as the mountain plover, by preventing establishment of competing species. Management for high deer and elk populations can also result in increased grazing and browsing pressure on listed plant species.

Most native plant species have adapted to a certain level of grazing pressure. Grazing management practices are often incompatible with the continued survival of certain species. For many species, the grazing management that would best suit the species is simply unknown. This may lead to inappropriate habitat management practices.

Logging on State and private lands can kill or harm listed species that require mature forest habitat (e.g., marbled murrelet, northern spotted owl). These species could be directly killed or injured by destruction of active nests, or indirectly harmed by increasing predation risk or reducing the availability of nest sites, suitable foraging habitat, or prey.

Fire management activities can change the fuel load and the frequency and severity of fires. The fire regime can affect listed plants by changing germination success, seed bank composition, adult mortality, and intensity of interspecific competition.

Management regimes that pose a threat to species include: lack of protection on private lands, lack of funding for protection, lack of funding for correct management, management practices for one species that eliminates another, or inappropriate habitat management due to lack of information on the biology of the species. Private land management practices can also be incompatible with the continued viability of species.

Population Size and Life History

Certain aspects of the biology of species put them more at risk of extinction from habitat degradation and fragmentation. Small populations and/or short-lived species (e.g., delta smelt have a one-year life span) are more at risk to random catastrophic events than large populations. Events such as drought, flooding, predators or pests, fires, and disease can pose a serious threat to a species that is limited to only several small populations. Small populations are also at risk of genetic drift, hybridization with closely related species or subspecies, and inbreeding. The lack of genetic variability leaves species at further risk to random events. Many native species are dependent on rare habitat types, leaving them at risk from development in these areas. Species with low density, low reproductive rate, large home ranges, or dependency on social facilitation are further at risk to multiple stressors.

Conclusion

Listed Species/Critical Habitat

After reviewing the current status of the species in Appendix C, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the extent of take anticipated at the programmatic level is not likely to result in jeopardy to the species listed in Appendix C, or destruction or adverse modification of critical habitat. In the absence of conservation measures or other CALFED Agency commitments listed in the Description of the Proposed Action, the effects analysis above would support a

conclusion of jeopardy for many of the listed species in the effected area. However, this no-jeopardy determination is based upon implementation of and compliance with all of the Key Planned Actions listed in the Description of the Proposed Action.

Proposed Species

After reviewing the current status of the species in Appendix C, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's conference opinion that the extent of take anticipated at the programmatic level is not likely to result in jeopardy to the species listed in Appendix C. In the absence of conservation measures or other CALFED Agency commitments listed in the Description of the Proposed Action, the effects analysis above would support a conclusion of jeopardy for many of the listed species in the effected area. However, this no-jeopardy determination is based upon implementation of and compliance with all of the Assumptions listed in the Description of the Proposed Action.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of ESA do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that ESA requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State law, including the California Endangered Species Act, or in the course of any violation of a State criminal trespass law.

Due to the programmatic nature of these biological and conference opinions, the project- and site-specific information necessary to determine the amount and extent of incidental take of listed and proposed species associated with individual CALFED Program activities/actions is lacking. Thus, CALFED Agencies will initiate individual Section 7 consultations or develop individual habitat conservation plans in coordination with the Service for actions/activities which may affect listed and proposed species. Future biological and conference opinions that are tiered under this programmatic opinion will estimate, evaluate, and authorize the amount and extent of incidental take associated with project-specific actions. Incidental take of listed and proposed species is not authorized in this programmatic biological opinion.

Reporting Requirements

The CALFED Agencies shall notify the Service immediately if dead or injured endangered species are found during implementation of actions or on CALFED Agencies' lands. CALFED Agencies must submit a report including date(s), location(s), habitat description, and any corrective measures taken to protect the individual(s) found. If endangered animals are captured, the report shall also include photographs of the individuals, condition of the individual, length of time held, release location, and any other pertinent information.

For all endangered species encountered during construction and construction-related activities, CALFED Agencies shall submit locality information to the California Department of Fish & Game (CDFG), using completed California Native Species Field Forms or their equivalent, within 90 calendar days of the species being observed. Each form shall have an accompanying scale map of the site (such as a photocopy of a portion of the appropriate 7.5 minute U.S. Geological Survey map) and shall provide at least the following information: township, range, and quarter section; name of the 7.5- minute or 15-minute quadrangle; dates (day, month, year) of field work; number of individuals and life stage (where appropriate) encountered; and a description of the habitat by community-vegetation type.

For those projects requiring a Service-approved biologist or where mitigation is required, a post-construction compliance report prepared by the Service-approved monitoring biologist shall be forwarded to the Chief, Endangered Species Division, at the Sacramento Fish and Wildlife Office within 60 calendar days of the completion of each project and shall include the file number of this consultation on the cover sheet (1-1-F-00-184). This report shall detail (1) dates that construction occurred; (2) pertinent information concerning the applicant's success in meeting project mitigation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on federally listed species, if any; (5) occurrences of incidental take of

federally listed species, if any, (including handling and relocation); and (6) other pertinent information.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation and conference on the actions outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Reinitiation will occur not later than 180 days prior to September 30, 2004. The purpose of the reinitiation is to evaluate the efficacy of the EWA and progress toward achieving the Milestones, including funding commitments, in conserving and promoting the recovery of listed species. The reinitiation of consultation is expected to result in supplemental biological opinions, which could be appended to the original biological opinions.

You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if the species are listed. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the CALFED Program and no further section 7 consultation will be necessary.

After listing of the species and any subsequent adoption of this conference opinion, the Federal Agencies shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the species has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the species may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

Appendices

Appendix A--Maps

Appendix B--List of Listed and Proposed Species in Focus Area

Appendix C--Species Accounts

Appendix D--Proposed Programmatic Actions Evaluated

Appendix E--EWA Operating Principles

Appendix F--T&E Take Avoidance and Minimization Measures

Appendix G--T&E Compensation Measures

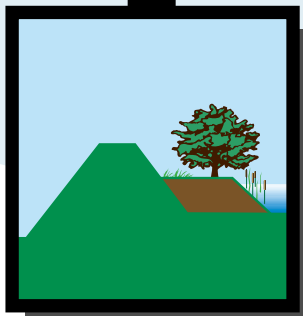
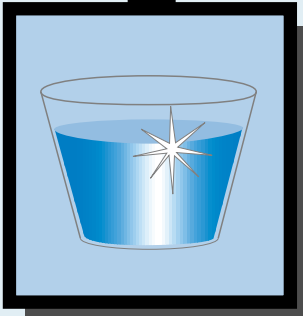
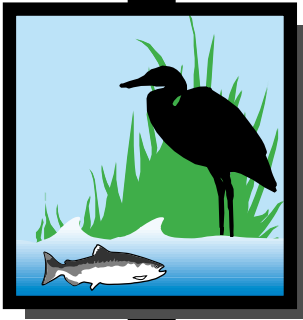
Appendix H--General Measures to Avoid and Minimize Take

Appendix I--Botanical Inventory Guidelines

Appendix J--Milestones

LITERATURE CITED

The literature cited in this biological opinion is contained within Service files and is available upon request.



CALFED
BAY-DELTA
PROGRAM

Attachment 6b
Programmatic Endangered Species Act
Section 7 Biological Opinions
 National Marine Fisheries Service

August 28, 2000



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

August 28, 2000

In Reply Refer to:
SWR-00-SA-0110:MEA

Mr. Lester A. Snow
Regional Director
United States Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95825-1898

Dear Mr. Snow:

This document transmits the National Marine Fisheries Service (NMFS) biological opinion for the implementation phase of the CALFED Bay-Delta Program. This biological opinion is based on NMFS' review of the proposed CALFED Bay-Delta Program, and its effects on the federally endangered Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), and threatened Central Valley spring-run chinook salmon (*O. tshawytscha*) and their designated critical habitat in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your August 18, 2000 request for a programmatic consultation, made on behalf of the Bureau of Reclamation (Reclamation) and the other Federal co-lead agencies for the CALFED Bay-Delta Program (Environmental Protection Agency, Army Corps of Engineers, Natural Resources Conservation Service, and Fish and Wildlife Service), was received on August 18, 2000.

This document also transmits NMFS' Essential Fish Habitat (EFH) Conservation Recommendations for Pacific coast salmon, coastal pelagic species, and west coast groundfish which may be effected by the proposed action as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as amended (16 U.S.C. 1801 *et seq.*). While EFH designations for salmon have yet to be approved by the Secretary of Commerce, we expect them to be forthcoming and provide these recommendations to facilitate your consultation obligations.

The biological opinion and EFH conservation recommendations are based on information provided in the Programmatic Environmental Impact Statement (PEIS) for the CALFED Bay-Delta Program (Program) and the Multi-Species Conservation Strategy (MSCS), an appendix to the PEIS, which is the biological assessment for the Program. A complete administrative record of this consultation is on file in NMFS' Sacramento Area Office, Sacramento, California.

Based upon the best available scientific and commercial information, this biological opinion concludes that implementation of the CALFED Bay-Delta Program is not likely to jeopardize the continued existence of federally endangered Sacramento River winter-run chinook salmon, threatened Central Valley steelhead, and threatened Central Valley spring-run chinook salmon or result in the destruction or adverse modification of designated critical habitat for these species.




However, implementation of the CALFED Bay-Delta Program addressed in this biological opinion is anticipated to result in incidental take of listed species. Due to the programmatic nature of the PEIS and CALFED's Preferred Program Alternative, the project specific and action specific information necessary to determine the amount and extent of incidental take of endangered Sacramento River winter-run chinook salmon, threatened Central Valley steelhead, and threatened Central Valley spring-run chinook salmon associated with individual CALFED Program activities/actions is lacking. Therefore, incidental take of endangered Sacramento River winter-run chinook salmon, threatened Central Valley steelhead, and threatened Central Valley spring-run chinook salmon is not authorized in this biological opinion. NMFS anticipates that Reclamation and/or other Federal CALFED co-lead action agencies, as appropriate, will initiate project specific or action specific consultations tiered to this programmatic consultation. These future consultations, tiered under this programmatic consultation, will evaluate and estimate the amount of incidental take of listed species associated with action specific implementation plans and, if appropriate, authorize the amount and extent of incidental take.

As provided in 50 CFR § 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this opinion; (3) the action is subsequently modified in a way that causes an effect on listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. Since this programmatic consultation does not provide incidental take authorization, Reclamation and/or Federal CALFED co-lead action agencies shall initiate consultations with the NMFS for action specific implementation plans, which may effect listed anadromous salmonids and are to be tiered under this programmatic biological opinion.

Reclamation and the Federal CALFED co-lead agencies have a statutory requirement under section 305(b)(4)(B) of the MSFCMA to submit a detailed response in writing to NMFS that includes a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH, as required by section 305(b)(4)(B) of the MSFCMA and 50 CFR 600.920(j) within 30 days. If unable to complete a final response within this time limit, an interim written response should be provided to NMFS within 30 days. A detailed response should follow.

If you have any questions concerning the biological opinion or the attached EFH conservation recommendations please contact Mr. Michael Aceituno in our Sacramento Area Office, 650 Capitol Mall, Suite 6070, Sacramento, CA 95814. Mr. Aceituno may be reached by telephone at (916) 498-6498.

Sincerely,


Rebecca Lent, Ph.D.
Regional Administrator

Enclosure

CALFED BAY-DELTA PROGRAM

PROGRAMMATIC BIOLOGICAL OPINION (Endangered Species Act - Section 7 Consultation)

and

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS (Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

Prepared by
National Marine Fisheries Service
Southwest Region

August 28, 2000

Endangered Species Act -Section 7 Consultation

BIOLOGICAL OPINION

Agency: CALFED - Federal Co-Lead Agencies (Bureau of Reclamation, Fish and Wildlife Service, Army Corps of Engineers, Environmental Protection Agency, National Marine Fisheries Service, and Natural Resources Conservation Service)

Activity: CALFED Bay-Delta Program Final Programmatic Environmental Impact Statement/Environmental Impact Report - Preferred Program Alternative

Consultation Conducted By: National Marine Fisheries Service, Southwest Region.

Date Issued: August 28, 2000

INTRODUCTION

This document transmits the National Marine Fisheries Service' (NMFS) biological opinion on the effects of the Preferred Program Alternative described in the CALFED Bay-Delta Program (CALFED Program) Final Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/EIR), dated July 2000, on federally listed endangered Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), and threatened Central California Coast steelhead (*O. mykiss*) in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.).

This consultation is intended to address in a comprehensive manner the numerous and widely varied actions related to the implementation of the CALFED Program. While CALFED Program actions are clearly interrelated and interdependent, many actions implemented by the various CALFED Agencies are not and could not be considered as stand alone actions. Nevertheless, the U.S. Fish and Wildlife Service (USFWS) and NMFS have agreed with the other CALFED Agencies that to facilitate ESA compliance, the activities that are listed in the Project Description would be evaluated as a suite of actions all related in one form or another to the CALFED Program. Therefore, this biological opinion addresses the effects upon listed species resulting from the implementation of this suite of actions as a whole and also provides a strategy, or process, for ESA compliance on the individual activities that cumulatively make up the CALFED Program.

CALFED Program implementation , in conjunction with the Multi-Species Conservation Strategy and programmatic biological opinions, will provide benefits in subsequent site specific consultations. Specifically, individual projects that qualify for consultation will be evaluated within the context of the program as a whole, including the major elements designed to improve the environmental baseline and lead to recovery of targeted species. These major elements will be

subject to on-going monitoring, evaluation, and the application of adaptive management. Site specific biological opinions will take into account the environmental benefits that accrue from the CALFED Program. As a result, the NMFS and the USFWS anticipate the implementation of the overall CALFED Program will streamline the ESA compliance process and, as actions to benefit listed species are implemented, will reduce the need for additional provisions to satisfy legal requirements.

A number of key program actions related to the implementation of a variety of activities, especially those related to addressing the needs of listed species, are considered in developing this biological opinion at the programmatic level. These key program actions are critical to the overall determination of how implementation of this suite of actions may, or may not jeopardize listed species because the effects of the actions are evaluated in the aggregate. If key program actions are not implemented at this programmatic level, or new information becomes available, consultation would be reinitiated at the programmatic level to ascertain how the lack of implementation of any action(s), or new information, affects the evaluation of effects upon listed species associated with the overall implementation of the suite of actions being considered and the subsequent conclusions made in this biological opinion.

The project-specific or tiered consultations that will follow this programmatic consultation will rely on implementation of the key program actions to direct the development and implementation of the project-specific actions. If the CALFED Program fails to implement conservation measures or if new information becomes available then reinitiation on the programmatic level may be necessary.

BACKGROUND

The CALFED Program was initiated in May 1995 by then Governor Pete Wilson and the Clinton Administration to address environmental and water management problems associated with the Bay-Delta. In June 1995, State and Federal agencies launched a partnership to develop and implement a comprehensive, long-term management plan for the Bay-Delta. The management plan is intended to address problems of the Bay-Delta system within four critical, often competing, resource categories: ecosystem quality, water quality, levee system integrity, and water supply reliability. The CALFED Program officially involves the 18 CALFED Agencies with management or regulatory responsibilities in the Bay-Delta. Stakeholder input is facilitated through the Bay-Delta Advisory Committee (BDAC).

At its inception, the CALFED Program was divided into two planning phases (Phase I and II) and an implementation phase (Phase III). During Phase I, the CALFED Program concentrated on identifying and defining the problems confronting the Bay-Delta system. A mission statement and guiding principles were developed, along with CALFED Program objectives and an array of potential actions to meet them. Phase I was completed in September 1996.

During Phase II the CALFED Program developed a preferred program alternative (Preferred Program Alternative) and conducted a comprehensive programmatic environmental review process. Because the CALFED solution area is so large, and because it is approaching its task in an integrated, comprehensive way, environmental review must be conducted on a very broad level. Phase II ends following the signing of a Federal Record of Decision (ROD) and State Certification of the Final PEIS/PEIR. Phase III will begin with implementation of the CALFED Program. The CALFED Program solution plan is expected to take 30 years or more to complete.

CONSULTATION HISTORY

Early in Phase I, from July 1995 to July 1996, the co-lead Federal CALFED Agencies held more than 30 public meetings and workshops around the State to involve Californians in developing a Bay-Delta solution. The participating Federal agencies included NMFS, Natural Resources Conservation Service (NRCS), Army Corps of Engineers (Corps), Bureau of Reclamation (Reclamation), Environmental Protection Agency (EPA), and the USFWS. The problems of the Bay-Delta were defined and a range of alternative solutions was developed. Additionally, three preliminary alternatives for Delta water conveyance were identified for further analysis during Phase II. The first conveyance configuration relied primarily on the existing conveyance system, with some minor changes in the south Delta. The second configuration relied on enlarging channels within the Delta. The third configuration included in-channel modifications and a conveyance channel that would move some water around the Delta. Each of these alternatives also included new ground and surface water storage options. Proposed management actions were grouped into six CALFED Program elements (i.e., levee system integrity, water quality improvements, ecosystem restoration, water use efficiency measures, water transfers, and watershed management). In February 1996, the CALFED Program released 20 draft alternative solutions, each including hundreds of actions to help solve the Bay-Delta problems.

CALFED Agencies participated on management and technical teams (e.g., the Water Management Strategy [WMS] and Multi-Species Conservation Strategy [MSCS] teams, and the Ecosystem Restoration Program [ERP] Focus Group) and contributed to several planning documents developed during Phase II, including the Draft (March 1998) and Final (July 2000) PEIS/PEIR; and Administrative Draft (March 31, 2000), Draft (April 17, 2000) and Final (July 2000) MSCS, which serves as the biological assessment for the CALFED Program section 7 consultation.

In June 1996, the list of alternatives was refined to three conceptual comprehensive approaches. In September 1996, the CALFED Agencies released the Phase I Final Report and launched a two-year environmental review of the conceptual alternative solutions. This action concluded Phase I of the CALFED Program and moved it into Phase II.

From June 1996 to December 1997, the CALFED Agencies held hundreds of public meetings to continue to involve the public in the process. Technical staff from various agencies worked with stakeholders to further refine the list of alternatives.

From March 1997 to November 1997, the CALFED Agencies released draft reports for four programs that were common to all of the alternatives. These draft reports included: the Ecosystem Restoration Program Plan, the Water Quality Component Report, the Water Use Efficiency Report, and the Delta Levee System Integrity Program Report.

In December 1997, more than \$60 million in ecosystem restoration program projects were funded. This led to an additional \$24 million in ecosystem restoration projects being funded in February 1998.

On March 16, 1998, the CALFED Agencies released a draft PEIS/PEIR containing the refined draft alternatives. The release was followed by a 105-day public comment period, which ended on July 1, 1998. Additionally, during the March 16, 1998 to July 1, 1998 time frame, the CALFED Agencies conducted further technical analyses to develop the draft Preferred Program Alternative, while also hosting public meetings, hearings, and workshops to continue to get public input.

In September 1998, another \$25.5 million in ecosystem restoration projects were funded. In December 1998, the CALFED Agencies issued the Revised Phase II Report and draft framework plan for a Preferred Program Alternative.

On June 25, 1999, the CALFED Agencies released a revised draft PEIS/PEIR, which was followed by a 90-day comment period.

In July 2000, the CALFED Agencies released the final PEIS/PEIR which was followed by a 30-day comment period.

On August 18, 2000, NMFS received a request for initiation from Reclamation, which is serving as the lead agency for this consultation.

BIOLOGICAL OPINION

Description of the Proposed Action

A. Geographic Scope and Action Area

The geographic scope of CALFED includes two distinct areas, the “Problem Area” and the “Solution Area”. The Problem Area is defined as the legal Delta and Suisun Bay and Marsh. The Solution Area is much broader in extent than the Problem Area; encompassing the Central Valley watershed, the upper Trinity River watershed, the southern California water system service area, San Pablo Bay, San Francisco Bay, portions of the Pacific Ocean out to the Farallon Islands, and a near-shore coastal zone that extends from about Morro Bay to the Oregon border (CALFED MSCS, July 2000). The primary focus area of CALFED’s MSCS includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries

downstream of major dams, and the potential locations of reservoirs. This is the area defined as the “Action Area” for purposes of the following Biological Opinion.

Areas outside the MSCS Focus Area but within the CALFED Solution Area such as watersheds above major dams, including a portion of the upper Trinity River watershed, and included within CALFED’s Watershed Program Area, other Central Valley Project (CVP) and State Water Project (SWP) service areas that are located outside the MSCS Focus Area, the outer bay region including near-shore coastal areas are not included within the action area for the following biological opinion. This is because potential CALFED actions either do not extend into these areas or potential effects cannot be determined until individual CALFED actions or groups of actions are identified and defined. Since these actions outside the MSCS Focus Area are not evaluated in this opinion, they will not be subject to application under this programmatic biological opinion and will be evaluated, if necessary, under separate consultations.

B. CALFED Bay-Delta Program

The CALFED Program is a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program addresses issues in four general problem areas: ecosystem quality, water quality, water management, and levee system integrity. The following CALFED Program components were developed to solve issues in the problem areas:

- Levee System Integrity Program (LSIP)
- Water Quality Program (WQP)
- Ecosystem Restoration Program (ERP)
- Water Use Efficiency Program (WUEP)
- Water Transfer Program (WTP)
- Watershed Program (WP)
- Storage
- Conveyance
- Environmental Water Account (EWA)
- Science Program
- Multi-Species Conservation Strategy (MSCS)
- Governance Plan

Most CALFED Program elements are described in technical appendices to the PEIS/PEIR. Storage and Conveyance are described separately. The EWA is an operational strategy intended to improve fish protection while not adversely affecting water supply.

All aspects of the CALFED Program are interrelated and interdependent. Ecosystem restoration is dependent upon supply and conservation. Supply is dependent upon water use efficiency and consistency in regulation. Water quality is dependent upon water use efficiency and consistency in regulations, improved conveyance, levee stability and healthy watersheds.

The CALFED Program includes a framework guiding implementation that addresses the scope, complexity, and duration of the CALFED Program, and the relative uncertainty regarding the CALFED Program's approach in resolving issues in the problem areas. Implementation is supported by an Implementation Plan that describes Stage 1 actions, CALFED Program integration, governance, and financing. In addition, a Science Program is included to carry out monitoring, assessment and research; and a MSCS will be followed to achieve compliance with the ESA. Implementation of the CALFED Program will be guided by an adaptive management approach with monitoring of performance to help modify (adapt) future actions and contribute to decision making. Also, the CALFED Program will be guided by the principle of balanced implementation of CALFED Program elements.

The term of this programmatic biological opinion includes Phase III of the CALFED Program (30 years or more), provided the CALFED Program remains in compliance with this programmatic biological opinion. NMFS will evaluate the CALFED Program's consistency with this biological opinion at numerous points in the future, including:

- During review of annual reports submitted by the CALFED Program.
- During subsequent, tiered informal and formal consultation on Action Specific Implementation Plans (ASIPs).
- After 4 years of implementation when sufficient data is collected and analyzed to fully evaluate the effectiveness of the WMS, together with other conservation elements, in meeting the conservation objectives of the CALFED Program.
- At the conclusion of Stage 1 to assess the Program's compliance in achieving the conservation objectives established in the CALFED "Milestones."

If NMFS determines that the CALFED Program is not in compliance with this biological opinion, the CALFED Agencies will reinstate this programmatic consultation. In addition, refer to the Reinitiation Statement in this consultation for further reasons for reinitiation.

The following sections describe the CALFED Program and its elements in greater detail.

Levee System Integrity Program (LSIP)

The LSIP's goal is to improve levees and levee management in the legal Delta and will investigate the level of levee work in Suisun Marsh, which together define its scope. All projects under the LSIP will be implemented to be fully consistent with other CALFED Program elements, including the ERP, Conveyance, and MSCS. Project-specific plans will incorporate appropriate elements of these other programs and strategies. Individual projects pursued under the LSIP, including each of the levee plans described below, will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA. The LSIP is comprised of the following five elements in the Delta, and a plan for Suisun Marsh levees:

Delta Levee Base Level Protection Plan. The CALFED Program will provide funding to participating local agencies in the Delta to reconstruct certain Delta levees to a uniform, base-level standard. The tentative standard is the Public Law (PL) 84-99 Delta Specific Standard (PL 84-99). Constructing levees to the PL 84-99 criteria is a prerequisite for, but not a guarantee of, post-flood Federal disaster assistance. This plan will evaluate the estimated 520 miles of non-Federal levees in the Delta and recommend levee segments that should conform with the Delta Specific Standard criteria. In addition, a funding mechanism will be established to support the routine inspection and maintenance of levees in the Delta, and for emergency response.

Delta Levee Special Improvement Projects. These projects will target areas that will provide flood protection above base-level standards for some islands protecting public benefits such as water quality, the ecosystem, life and personal property, agricultural production, cultural resources, recreation, and local and Statewide infrastructure. The scope of the Delta Levee Special Improvement Projects encompasses the Delta and levees bordering the northern Suisun Bay from Van Sickle Island to Montezuma Slough. Maintenance of upgraded levees will occur in conformance with specific criteria, consistent with meeting ERP objectives.

Delta Levee Subsidence Control Plan. The goal of this plan is to minimize the risk to levee integrity from land subsidence, in coordination with other CALFED Program elements. Measures will be implemented to reduce, eliminate, or reverse subsidence within a “zone of influence” (approximately 0-500 ft) adjacent to affected levees. Subsidence control techniques include:

- Geotechnical engineering principles and practices in conjunction with proven construction methods.
- Modifying seepage control, dewatering efforts, excavations, and land management activities near levees to best manage levee integrity.
- Strategically locating and constructing stability and drainage berms.
- Restricting practices such as land leveling, ditching, and certain other ground surface modifications within the zone of influence.
- Promoting high ground water levels and vegetation growth, where appropriate, to limit subsidence due to oxidation.

Delta Levee Emergency Management and Response Plan. The goals of this plan are to enhance existing emergency management response capabilities in the Delta, and to develop a stable funding source for emergency response. Future planning will concentrate on improving funding, resources, and response by State and Federal agencies; integrating response by all levels of government; clarification of regulatory procedures; and improving dispute resolution procedures.

Delta Levee Risk Assessment and Risk Management Strategy. The goals of this strategy are to quantify the risks to Delta levees, evaluate the consequences, and develop an appropriate risk management strategy by the end of Stage 1.

Suisun Marsh Levee System Plan. The CALFED Program will evaluate whether to include the Suisun Marsh levee system in the Levee Integrity Plan, and, if included, what level of protection is appropriate. This plan will evaluate the appropriate level of protection for Suisun Marsh levees, evaluate the best method of protection, and implement the method during Stage 1. This plan may protect part of the levee system by rehabilitating and maintaining some levees to protect managed wetlands and develop new tidal wetlands. Implementation will incorporate ERP and MSCS actions, consistent with NMFS-approved recovery plans.

Proposed Levee System Integrity Program Stage 1 Actions

The CALFED Agencies will evaluate the following LSIP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the LSIP.

- Initiate the Levee Program Coordination Group. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning, design, implementation, and management of levee projects (yr 1).
- Obtain short-term Federal and State funding authority as a bridge between the existing Delta Flood Protection Authority (AB 360) and long-term levee funding (yr 1-5).
- Obtain long-term Federal and State funding (yr 1-7).
- Conduct project level environmental documentation and obtain appropriate permits for each action/group of actions (yr 1-7).
- Implement demonstration projects for levee designs, construction techniques, sources of material, reuse of dredge material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e., construction) and long-term (i.e., maintenance and design) ecosystem benefits, and provide increased information (yr 1-7).
- Adaptively coordinate Delta levee improvements with ecosystem improvements by incorporating successful techniques for restoring, enhancing, or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (yr 1-7).
- Fund levee improvements up to PL 84-99 criteria in Stage 1; e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements (yr 1-7).
- Further improve levees which have significant Statewide benefits in Stage 1; e.g., State-wide benefits to water quality and highways (yr 1-7).

- Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements (yr 1-7).
- Enhance existing emergency response plans; e.g., establish a revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contacts for flood fighting and recovery operations, and outline environmental considerations during emergencies (yr 1-7).
- Implement current Best Management Practices (BMPs) to correct subsidence effects on levees. Assist CALFED Program's Science Program activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED Program objectives (yr 1-7).
- Develop BMPs for the reuse of dredge materials (yr 1).
- Institute a program for using Bay and Delta dredge material to repair Delta levees and restore Delta habitat (yr 1-7).
- Complete total risk assessment for Delta levees and develop and begin implementation of risk assessment options as appropriate to mitigate potential consequences (yr 1-7).
- Complete the evaluation of the best method for addressing the Suisun Marsh levee system (yr 1-2).

Water Quality Program (WQP)

The CALFED Program's WQP will strive to create water quality conditions that fully support a healthy and diverse ecosystem and the multiplicity of human uses of water. The geographic scope of the WQP encompasses five regions: the legal Delta; the Bay Region which includes Suisun Bay and Marsh, San Pablo Bay, and the San Francisco Bay watershed; the Sacramento River Region, bounded by the ridge tops of the Sacramento River watershed or hydrologic region; the San Joaquin River Region which includes both the San Joaquin River and Tulare Lake hydrologic basins; and, SWP and CVP service areas outside the Central Valley.

The CALFED Program's Water Quality Technical Group has identified the following water quality parameters of concern to beneficial uses: mercury, selenium, trace metals (copper, cadmium, and zinc), pesticides (carbofuran, chlorodane, chlorpyrifos, DDT, diazinon, PCBs, and toxaphene), drinking water disinfection by-product precursors (bromide and total organic carbon), dissolved oxygen and oxygen reducing substances, ammonia, salinity (total dissolved solids), temperature, turbidity and sedimentation, pathogens, nutrients (nitrogen and phosphorus), pH (alkalinity), chloride, boron, sodium absorption ratio, and toxicity of unknown origin. These parameters provide the focal points for developing and implementing the CALFED Program's water quality actions. The July 2000 WQP Plan, a technical appendix to the CALFED Program's Final PEIS/PEIR, provides a full description of the WQP. Individual projects pursued under the WQP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA.

Water Quality Program Plan

The WQP, largely through its agency-stakeholder Water Quality Technical Group, has developed programmatic actions to address water quality parameters of concern and beneficial use impairments. Water quality impairments or problems and associated programmatic actions to treat these problems are described in the WQP Plan. The WQP Plan is organized by the following sections: low dissolved oxygen and oxygen depleting substances, drinking water, mercury, pesticides, organochlorine pesticides, salinity, selenium, trace metals, turbidity and sedimentation, toxicity of unknown origin, and a section on implementation strategy. The environmental water quality components, including proposed actions, were transferred to and are now administered under the ERP. However, to maintain consistency between the Draft PEIS and Final PEIS, CALFED Agencies have left the environmental components in the WQP Plan.

Proposed Water Quality Program Stage 1 Actions

The CALFED Agencies will evaluate the following water quality actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WQP Plan.

General Water Quality Actions

- Prepare project level environmental documentation and permitting as needed (yr 1-7).
- Coordinate with other CALFED Program elements to ensure that in-Delta actions maximize potential for Delta water quality improvements (yr 1-7).
- Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).

Environmental Water Quality Action:

Conduct the following mercury evaluation and abatement work:

Cache Creek:

- Risk appraisal and advisory for human health impacts of mercury (yr 1-5).
- Support development and implementation of Total Maximum Daily Load (TMDL) for mercury (yr 1-7).
- Determine bioaccumulation effects in creeks and the Delta (yr 1-4).
- Source, transport, inventory, mapping and speciation of mercury (yr 1-7).
- Information Management/Public Outreach (yr 5-7).
- Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate (yr 3-5).
- Investigate sources of high levels of bioavailable mercury (yr 4-7).

Sacramento River:

- Investigate sources of high levels of bioavailable mercury; inventory, map, and refine other models (yr 3-7).
- Participate in remedial activities (yr 7).

Delta:

- Research methylation (part of bioaccumulation) process in Delta (yr 1-2).

- Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 3-7).
- Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 3-5).

Conduct the following pesticide work:

- Develop diazinon and chlorpyrifos hazard assessment criteria with the CDFG and the Department of Pesticide Regulations (yr 1).
- Support development and implementation of a TMDL for diazinon (yr 1-7).
- Develop BMPs for dormant spray and household uses (yr 1-3).
- Study the ecological significance of pesticide discharges (yr-1-3).
- Support implementation of BMPs (yr 2-7).
- Monitor to determine effectiveness (yr 4-7).

Conduct the following trace metals work:

- Determine spatial and temporal extent of metal pollution (yr 3-7).
- Determine ecological significance and extent of copper contamination (yr 1-3).
- Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).
- Participate in Brake Pad Partnership to reduce introduction of copper (yr 1-7).
- Partner with municipalities on evaluation and implementation of stormwater control facilities (yr 2-5).
- Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (yr 2-7).

Conduct the following selenium work:

- Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
- Evaluate and, if appropriate, implement real-time management of selenium discharges (yr 1-7).
- Expand and implement source control, treatment, and reuse programs (yr 1-7).
- Coordinate with other programs (yr 1-7); e.g., recommendations of San Joaquin Valley Drainage Implementation Program, and CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways.

Conduct the following sediment reduction work/organochlorine pesticides:

- Participate in implementation of the United States Department of Agriculture (USDA) sediment reduction program (yr 1-7).
- Promote sediment reduction in construction areas and urban stormwater, and other specific sites (yr 1-7).
- Implement stream restoration and revegetation work (yr 4-7).
- Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
- Coordinate with ERP on sediment needs (yr 1-3).

Conduct the following work addressing dissolved oxygen (DO) and oxygen depleting substances (including nutrients):

- Complete studies of causes for DO sag in San Joaquin River near Stockton (yr 1-2).
- Define and implement corrective measures for DO sag (yr 1-7).

- Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
- Develop inter-substrate DO testing in conjunction with the ERP (yr 2-4).
- Study nutrient effects on beneficial uses (yr 4-7).
- Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations (yr 1-7).
- Support finalizing investigation of methods to reduce constituents that cause low DO for inclusion in TMDL recommendation by the Central Valley Regional Water Quality Control Board (yr 2).
- Support finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River (yr 2).
- Support implementation of appropriate source and other controls as recommended in the TMDL (yr 3).
- Participate in identifying unknown toxicity and addressing as appropriate (yr 1-7).

Drinking Water Quality Actions

Actions specific to drinking water improvements:

- Work with Bay Area water suppliers as they develop a Bay Area Blending/ Exchange Project (yr 1-7).
- Address drainage problems in the San Joaquin Valley to improve downstream water quality (yr 1-7).
- Implement source controls in the Delta and its tributaries (yr 1-7).
- Support ongoing efforts of the Delta Drinking Water Quality Council (yr 1-7).
- Invest in treatment technology demonstrations (yr 1-7).
- Control runoff into the California Aqueduct and other similar conveyances (yr 1-7+).
- Address water quality problems at the North Bay Aqueduct (yr 1-7).
- Conduct comprehensive evaluations, pilot programs, and full scale actions to reduce Total Organic Carbon (TOC) contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvements (yr 1-7).
- Improve DO concentrations in the San Joaquin River near Stockton (yr 1-3).
- Study recirculation of export water to reduce salinity and improve DO in the San Joaquin River. If feasible, and consistent with ERP goals and objectives, implement a pilot program (yr 1-4).

Ecosystem Restoration Program (ERP)

The ERP will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta estuary and its watershed to support sustainable populations of diverse plant and animal species. All CALFED Program elements will contribute in varying degrees to this goal, with the ERP being the principal CALFED Program element designed to restore the ecological health of the Bay-Delta system. The ERP includes actions throughout the Bay-Delta watershed, focusing on the restoration of ecological processes and important habitats. The

CALFED Program proposes to improve ecosystem quality for the Bay-Delta system in order to reduce conflicts among beneficial uses of California's water. Individual projects pursued under the ERP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA.

The primary geographic focus area of the ERP is the Sacramento-San Joaquin Delta, Suisun and San Pablo Bay, the Sacramento River below Shasta Dam, the San Joaquin River below the confluence with the Merced River, and their major tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. This primary geographic focus area is divided into 14 ecological management zones (discussed in ERP Plan Volume II). The secondary geographic focus area is the upper watersheds surrounding the primary focus area and Central and South San Francisco Bay and their local watersheds.

Success of the CALFED Program hinges upon the full and successful funding and implementation of the ERP, MSCS, other existing and tiered biological opinions, as well as other environmental commitments. Although NMFS anticipates that some ERP actions will be refined or altered, based upon new information and adaptive management, the successful implementation of nearly all actions is necessary to achieve the species recovery goals identified in the ERP. The ERP is not designed as mitigation for projects to improve water supply reliability or to bolster the integrity of Delta levees, although it is expected that the environmental benefits associated with implementation of the ERP will facilitate the review of such projects. Improving ecological processes and increasing the amount and quality of habitat are co-equal with other CALFED Program goals related to water supply reliability, water quality, and levee system integrity.

The ERP is comprised of a Strategic Plan and a two-volume restoration plan: Volume I which describes the ecosystem elements or attributes (ecological processes, habitats, species and species groups, and anthropogenic stressors) the program addresses; and, Volume II which presents the ecological management zones and proposed programmatic actions. The ERP would require individual section 7 consultations for actions which may affect listed species.

Ecosystem Restoration Program Strategic Plan and Goals

The ERP Strategic Plan contains the following goals and objectives:

- Goal 1: Achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in San Francisco Bay and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
- Goal 2: Rehabilitate natural processes in the Bay-Delta estuary and its watershed to fully support, with minimal ongoing human intervention, natural aquatic and associated terrestrial biotic communities and habitats, in ways that favor native members of those communities.

- Goal 3: Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP goals.
- Goal 4: Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.
- Goal 5: Prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.
- Goal 6: Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

There are several objectives under each goal. ERP goals and objectives are integrated with those of the CALFED Program's MSCS, WQP, and Nonnative Invasive Species Strategic Plan.

The ERP Strategic Plan also presents and describes:

- An ecosystem based management approach for restoring and managing the Bay-Delta ecosystem.
- An adaptive management process that is sufficiently flexible and iterative to respond to changing Bay-Delta conditions and to incorporate new information about ecosystem structure and function.
- The value and application of conceptual models in developing restoration actions and defining information needs, with examples of their development and use.
- Institutional and administrative considerations necessary to implement adaptive management, to ensure scientific credibility of the restoration program and to engage the public in the restoration program.
- Decision rules and criteria to help guide the selection and prioritization of restoration actions.
- Opportunities and constraints to be considered in developing a restoration program.

Ecosystem Restoration Program Plan

The ERP Plan is composed of two volumes. Volume I presents the elements or components of the ERP. These "ecosystem elements" are organized into four categories: ecological processes (e.g., central valley stream flows, Bay-Delta hydrodynamics, bay-delta aquatic foodweb); habitats (e.g., tidal perennial aquatic, saline emergent wetland, riparian and riverine aquatic); species and species groups (species designated for recovery, species designated for contribute to recovery, species assemblages designated for enhance and/or conserve biotic communities, harvested species to be maintained and/or enhanced); and, stressors (e.g., water diversions, nonnative invasive species, contaminants, gravel mining). Consult ERP Plan Volume I for the complete list and description of ERP ecosystem elements (total of 106 elements).

ERP Plan Volume II identifies over 600 programmatic actions to be implemented throughout the Bay-Delta estuary and its watershed over the 30-year period of the CALFED Program. Volume II also gives targets for the ecosystem elements (e.g., acres of tidal fresh emergent wetland to be restored). Volume II is organized by Ecological Management Zones. The primary ERP geographic focus area is divided into 14 Ecological Management Zones: Sacramento-San Joaquin Delta, Suisun Marsh/North San Francisco Bay, Sacramento River, North Sacramento Valley, Cottonwood Creek, Colusa Basin, Butte Basin, Feather River/Sutter Basin, American River Basin, Yolo Basin, Eastside Delta Tributaries, San Joaquin River, East San Joaquin, and West San Joaquin. Each zone is further divided into Ecological Management Units. Under each Ecological Management Zone are the ecosystem elements and associated proposed programmatic actions and restoration targets that the ERP will address in that zone. There is also a section in Volume II that gives ERP targets, MSCS species goal prescriptions, and MSCS conservation measures for species and species groups ecosystem elements.

Proposed Ecosystem Restoration Program Stage 1 Actions

CALFED Agencies will evaluate the following ERP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the ERP:

- Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning design, implementation, and management of ecosystem restoration projects (yr 1-7).
- Conduct project level environmental documentation and permitting as needed for each bundle of Stage 1 actions (yr 1-7).
- Fully coordinate with other ongoing activities which address ecosystem restoration in the Bay-Delta system; e.g., CVPIA, Four Pumps Agreement, Non-native Invasive Species Task Force (yr 1-7).
- Implement habitat restoration in the Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function and facilitate recovery of endangered species consistent with the goals of the ERP Strategic Plan and MSCS. Habitat restoration efforts in Stage 1 will: restore 2,000 acres of tidal perennial aquatic habitat; restore 200 acres of deep open water nontidal perennial aquatic habitat; restore 300 acres of shallow open water nontidal perennial aquatic habitat; enhance and restore 50 miles of Delta slough habitat; enhance and restore 50 to 200 acres of midchannel islands; restore 8,000 to 12,000 acres of fresh emergent (tidal) wetlands; restore 4,000 acres of fresh emergent (non-tidal) wetlands; restore 25 miles of riparian and riverine aquatic habitat; restore 1,000 to 2,000 acres of perennial grassland; and establish 8,000 to 12,000 acres of wildlife-friendly agricultural habitat. These actions represent approximately one-fourth of the acreage identified in the ERP to be restored during the 30-year implementation period (yr 1-7).
- Implement large-scale restoration projects on select streams and rivers (e.g., Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term

- restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in later stages (yr 1-7).
- Implement an EWA that acquires water for ecosystem and species recovery needs, substantially through voluntary purchases in the water transfer market in its first few years and developing additional assets over time (yr 1-7).
 - Pursue full implementation of ERP upstream flow targets, over and above EWA assets and regulatory actions, through voluntary purchases of at least 100,000 acre-feet of water by the end of Stage 1. Evaluate how the ERP water acquisitions and EWA water acquisitions will be integrated most effectively (yr 1-7).
 - Complete targeted research and scientific evaluations needed to resolve the high priority issues and the uncertainties identified in the ERP Strategic Plan (e.g., instream flow, non-native organisms, and Bay-Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in later stages (yr 1-7).
 - Establish partnerships with universities for focused research (yr 1-7).
 - Acquire floodplain easements, consistent with ecosystem and flood control needs along the Sacramento and San Joaquin Rivers (yr 4-7).
 - Continue high priority actions that reduce direct mortality to fishes (yr 1-7):
 - Screen existing unscreened or poorly screened diversions in the Delta, on the Sacramento River, San Joaquin River, and tributary streams based on a systematic priority approach.
 - Remove select physical barriers to fish passage.
 - Continue gravel management, e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries. Most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites (yr 1-7).
 - Develop and begin implementing a CALFED Program comprehensive non-native (exotic) invasive species prevention, control, and eradication plan including the following (yr 1-7):
 - Implement invasive plant management program in Cache Creek.
 - Develop ballast water management program.
 - Develop early-response invasive organism control programs.
 - Evaluate CALFED Program implementation actions and how those actions may benefit non-native species to the detriment of native species or the Bay-Delta ecosystem.
 - Provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above, e.g., pursue actions that are opportunity-based (willing sellers, funding, permitting), provide incremental improvements on private land through incentives, and develop partnerships with farmers on “environmentally friendly” agricultural practices (yr 1-7).
 - Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
 - Evaluate the feasibility of harvest management to protect weaker fish stocks (yr 1-7).

- Implement projects on selected streams to provide additional upstream fishery habitat by removing or modifying barriers (yr 1-7).
- Assist in the preparation of detailed, ecosystem-based restoration and recovery plans for any priority species identified in the ERP Strategic Plan and the MSCS for which up-to-date plans are not available. Begin implementing appropriate additional restoration actions identified in these plans (yr 1-7).
- Identify and advance specific regional ERP goals (yr 1-7).

Additional draft ERP Stage 1 actions are presented by Ecological Management Zone in Appendix D of the ERP Strategic Plan.

Water Use Efficiency Program (WUEP)

The WUEP relies on a combination of technical assistance, incentives, and directed studies for the four WUEP elements: Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands.

Technical assistance programs and directed studies will begin for all four elements. Incentive programs will be designed to award CALFED Program grant funding for projects that demonstrate potential to provide the CALFED Program water supply reliability, water quality, or ecosystem restoration benefits.

The WUEP includes water conservation and water recycling actions to facilitate efficient use of water at the regional and local level. Individual projects pursued under the WUEP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA. The programmatic water use efficiency actions include the following:

Water Conservation Related Actions

- Work with the California Urban Water Conservation Council (CUWCC) and the Agricultural Water Management Council (AWMC) to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and, in the case of the urban effort, identify a proper entity and process to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- Expand State and Federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.
- Assist urban water suppliers comply with the Urban Water Management Planning Act (UWMPA).
- Assist water suppliers and water users to identify and implement water management measures that can yield multiple benefits, including improved water quality and reduced ecosystem impacts.

- Identify and implement practices to improve water management on managed wetlands.
- Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
- Identify, in region-specific Strategic Plans for Agricultural Areas, quantifiable objectives to assure improvements in water management.

Water Recycling Actions:

- Assist local and regional agencies comply with the water recycling provisions in the UWMMPA.
- Expand State and Federal recycling programs in order to provide increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- Provide regional planning assistance that can increase opportunities for use of recycled water.

Proposed Water Use Efficiency Program Stage 1 Actions

CALFED Agencies will evaluate the following WUEP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WUEP.

- Expand existing State and Federal agricultural Water Conservation Programs to support on farm and district efforts. Expand State and Federal programs to provide technical and planning assistance to local agencies and districts in support of local and regional conservation and recycling programs (yr 1-7).
- Expand existing State and Federal conservation programs to support urban water purveyor efforts. Expand State and Federal programs to provide technical and planning assistance in support of conservation and recycling programs (yr 1-7).
- Utilize AB 3616 of the AWMC to evaluate and endorse Agricultural Water Management Plans to implement cost-effective water management practices by agricultural districts. Identify and secure ongoing funding sources for Agricultural Water Management Council and its members seeking to actively participate in the development, review, and implementation of these plans (yr 1-7).
- Develop Urban Water Management Plan Certification Process - Select an agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, and implement program (yr 1-3).
- Implement Urban BMPs Certification Process. Implement a process for certification of water suppliers' compliance with terms of the Urban Memorandum of Understanding (MOU) with respect to BMPs analysis and implementation for urban water conservation. Provide funding support for the CUWCC to carry out this function (yr 1-7).
- Prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED Program governance structure, for a competitive grant/loan incentive program for WUEP (yr 1). This will include:

- Incentives in the agricultural sector that will consider several factors, including: (i) potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUEP measures which result in reduced diversions; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the recipient area experiences recurrent water shortages due to regulatory or hydrological restrictions. Many of these factors are included in the Quantifiable Objectives for Agricultural Water Use Efficiency, and as such, the Quantifiable Objectives will be an important component of the agricultural incentive criteria.
- Incentives in the urban sector will assist in identifying and implementing urban water conservation measures that are supplemental to BMPs in the Urban MOU process and are cost effective from a Statewide perspective.
- Incentives for water recycling in the urban and agricultural areas.
- Annual reporting and evaluation mechanisms to gauge effectiveness of the program.
- Finalize and implement the methodology for Refuge Water Management which was described in the June 1998 “Interagency Coordinated Program for Wetland Water Use Plan, Central Valley, California” (yr 1-3).
- Research effort to establish appropriate reference conditions for evaluating program progress, and to identify improved methods for WUEP (yr 1-7).
- Assess the need for additional water rights protections. Evaluate the need for additional State regulations or legislation providing protection for water right holders who have implemented WUEP measures and subsequently transferred water to other beneficial uses (yr 1-4).
- Water Management. Develop State legislation that requires appropriate measurement of water use for all water users in California (yr 1-3).
- Create a Public Advisory Committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate State, Federal, regional and local efforts for maximum effectiveness of program expenditures (yr 1).

Water Transfer Program (WTP)

The CALFED Program’s WTP will encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests. CALFED Agencies have legal and regulatory responsibility for review and approval of most water transfers and also have jurisdiction over many of the storage and conveyance facilities required to make water transfers work. These agencies are in a position to improve or facilitate the operations of the water market by adopting policies and implementing programs that will allow transfers to be completed efficiently while protecting the environment. The Strategic Plan for Implementation provides direction and prioritization for implementation of the CALFED Program’s WTP, and includes the following actions:

Interactive California Water Market Information Web Site

- Develop the On Tap on-line water market information source for California water transfers.

Environmental, Socio-economic, and Water Resource Protection

- Recommend establishment of a California Water Transfers Information Clearinghouse (CWTIC) to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to facilitate assessment of potential third party impacts.
- Require additional water transfer analysis regarding direct and indirect impacts. The California Department of Water Resources (DWR), Reclamation, and the State Water Resources Control Board (SWRCB) will require transfer proponents to provide analysis of the direct and indirect impacts of a proposed transfer, in addition to CEQA, ESA compliance or other environmental requirements.
- Develop improved tracking protocols to ensure that water transferred to an instream flow can be tracked and then delivered to the intended destination.
- Work with stakeholders and the State Legislature to assist local agencies in development of groundwater management programs to protect groundwater basins in water transfer source areas.

Technical, Operational, and Administrative Rules

- Work to streamline the current water transfer approval processes through development of new tools, clarification of existing policies, refinement of processes and addition of staff and resources.
- Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions.
- Work with stakeholder representatives to resolve conflicts over carriage water criteria.
- Work with stakeholder representatives to develop criteria that protect other legal users of water from injury as a result of refill of a reservoir after the transfer of stored water.

Wheeling and Access to State/Federal Facilities

- Improve forecasting tools and more widely disclose potential pumping and conveyance capacity in project facilities, including limiting factors and inherent risks.
- Work with stakeholder representatives to consider modification of policies and procedures for transporting non-project water through existing project water conveyance facilities.
- Work with stakeholder representatives to develop cost criteria associated with transporting transferred water through State or Federal conveyance facilities.

Proposed Water Transfer Program Stage 1 Actions

CALFED Agencies will evaluate the following actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WTP.

- Develop an Interactive Water Transfer Information Web-site. CALFED Agencies will develop, implement, and maintain an interactive, publicly available web-site called On TAP (by the end of year 2000) (yr 1).
- Establish the CWTIC to operate and maintain the On TAP web-site, collect and disseminate data and information relating to water transfers and potential transfer impacts, and perform research using historic data to understand water transfer impacts (by year 2001) (yr 1).
- Coordinate with CALFED Agencies to require water transfer applicants to provide additional impact assessment information (yr 1-4).
- Identify, arrange, fund, and carry out a specific number of targeted water transfers for in-stream environmental purposes as part of the ERP, with a goal of using these transfers to evaluate the effectiveness of and make any necessary improvements to the California Water Code Section 1707 procedures and tracking protocols (yr 1-3).
- Establish a groundwater assistance program to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs (yr 1-2).
- Develop a streamlined water transfer approval process including “pre-certification” of certain classes of transfers and expedited environmental review procedures (yr 1-6).
- Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions (yr 1-3).
- Continue to work with stakeholder representatives to resolve conflicts over carriage water criteria (yr 1-3).
- Establish a refill criteria policy for reservoir storage based water transfers (yr 1).
- Begin forecast and disclosure processes of potential conveyance capacity in existing export facilities (Reclamation and DWR). This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1-7).
- Work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).

Watershed Program (WP)

The WP will use a comprehensive, integrated, basin-wide approach with a goal to improve conditions in the Bay-Delta system. This WP will emphasize local participation and provide financial and technical assistance for local watershed stewardship, and promote coordination and collaboration among watershed efforts.

The geographic scope of the WP encompasses the entire scope of the CALFED Program. The WP will support activities that provide benefits to the Delta, Suisun Bay, and Suisun Marsh.

The WP covers a broad geographic range and currently lacks project-specific measures for evaluation. Individual projects pursued under the WP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under section 7 or section 10 of the ESA. CALFED will ensure that appropriate measures to conserve special status species are included in all program actions.

There are five WP elements: coordination and assistance; adaptive management and monitoring; education and outreach; integration with other CALFED Program elements; and watershed processes and relationships. These elements, associated proposed programmatic actions, and an implementation strategy are described in the WP Plan.

The primary objectives of the WP are:

- Facilitate and improve coordination, collaboration, and assistance among government agencies, other organizations, and local watershed groups.
- Develop watershed monitoring and assessment protocols.
- Support education and outreach.
- Integrate the WP with other CALFED Program elements.
- Define the relationship between watershed processes and the goals and objectives of the CALFED Program.
- Implement a strategy that will ensure support and long term sustainability of local watershed activities.

Watershed activities will be supported that:

- are community based
- are collaborative and are consistent with the CALFED Program
- address multiple watershed issues
- are coordinated with and supported at multiple levels
- provide ongoing implementation
- include monitoring protocols
- increase learning and awareness.

Proposed Watershed Program Stage 1 Actions

The CALFED Program will evaluate the following WP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WP Plan.

- Fund and implement community based watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Program (yr 1-7).
- Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation among government agencies and stakeholder groups (yr 1-7).
- Implement a funding process and provide watershed stewardship funds to build the capacity of locally controlled watershed groups that ensure participation of local landowner groups (yr 1-7).
- Improve the use and usefulness of existing or future watershed information management functions to provide data and other information to people involved in watershed management (yr 3-7).
- Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (yr 1-7).
- Evaluate the benefits that accrue from watershed plans and projects designed to achieve CALFED Program goals and objectives (yr 3-7).
- Establish, fund, and maintain watershed restoration and maintenance assistance to aid local watershed groups and private landowners in project concept, design, and implementation (yr 1-7).
- Collaborate with other CALFED Program and non-CALFED Program elements on watershed related activities (yr 1-7).
- Provide appropriate information and assistance to stakeholders and the State Legislature to develop a Statewide umbrella Watershed Management Act (yr 1).

Water Management Strategy (WMS)

The WMS describes a framework to coordinate and integrate the water management tools in the program, evaluate the success of implementation efforts, and select additional tools needed to achieve the CALFED Program's water reliability objectives. The CALFED Program has identified three primary goals for the WMS: increase the utility of available water supplies (making water suitable for more uses and reuses); improve access to existing or new water supplies in an economically efficient manner, for environmental, urban and agricultural beneficial uses; and, improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses and decrease system vulnerability.

The tools that will be used to achieve the goals and objectives of the WMS include: the WUEP (agricultural, urban, and wetland water conservation and water recycling); the WTP; Conveyance, including South Delta Improvements; Storage; and, operational strategies, such as real-time diversion management and an EWA. In addition to these primary tools, the WMS will rely on additional CALFED Program tools to provide additional benefits. These include the WP, the WQP, and real-time monitoring through the Science Program.

Storage

The CALFED Program has initiated the Integrated Storage Investigation (ISI) to provide a comprehensive assessment of alternative surface and groundwater storage options and their utility to overall water management.

Decisions to implement new or expanded surface and groundwater storage will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual storage projects pursued under the WMS will fully evaluate project-level alternatives that are consistent with the decision documents in conformance with the legal requirements of section 404 of the Clean Water Act, as implemented under the MOU between the EPA and the COE regarding implementation of section 404, as implemented under the Memorandum of Understanding for section 404 of the Clean Water Act for the CALFED Program. The level of analysis required for specific storage projects will depend upon the programs and related commitments of the CALFED Program, including those related to water use efficiency, water transfers, and the ERP, being implemented. Direct and indirect effects, as appropriate, will be addressed under section 7 or section 10 of the ESA.

Site-specific studies of storage opportunities will be coordinated under the ISI. Specifically, the ISI will evaluate surface storage, groundwater storage, power facility re-operation, and removal of barriers to fish passage and, where appropriate, the potential for conjunctive operation of these different types of storage. These investigations will contribute to compliance with the requirements, within the Clean Water Act Section 404 Guidelines, and pursuant to the MOU between EPA and the COE.

The range of total new storage evaluated in Phase II was from zero up to about six Million acre-feet (MAF). Maximum Sacramento River off-stream or enlarged on-stream surface storage potential is estimated to be about three MAF of storage, while south of Delta off-aqueduct surface storage potential is estimated to be about two MAF of storage. Other types of surface storage considered in Phase II include San Joaquin River tributary storage and in-Delta storage. The CALFED Program will evaluate the feasibility of expanding two existing reservoirs and constructing a new off-stream reservoir with a total capacity of 950 thousand-acre-feet (TAF); and a major expansion of groundwater storage for an additional 500 TAF to one MAF. In addition, the CALFED Program will study two potential reservoir locations through partnerships with local agencies.

The CALFED Program will continue to evaluate surface and groundwater storage opportunities; initiate permitting, NEPA and CEQA documentation; and proceed with construction, only if all conditions are satisfied. In addition, the CALFED Program will continue to refine and periodically update the WMS. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability, and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Evaluation Framework will include: 1) a comprehensive hierarchy

of objectives for the CALFED Program; 2) well-defined measures of performance associated with the achievement of objectives; and 3) a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the WMS and determining appropriate levels of the future investment in various water management tools.

Proposed Stage 1 Storage Actions

The CALFED Program will evaluate the following Storage actions proposed for implementation during Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Storage program. Each storage action will require project-specific consultation under section 7 or a permit under section 10 of the ESA.

Groundwater Banking and Conjunctive Use The goal is to develop locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to one MAF of additional storage. This effort includes developing partnerships with local agencies and landowners in both the north-of-Delta and south-of-Delta areas, and includes the potential construction of several south-of-Delta projects. Additional south-of-Delta and north-of-Delta projects, if feasible, could be constructed in later stages.

- Finalize agreements with new local project proponents for joint planning and development (yr 1).
- Begin feasibility studies (yr 1).
- Report on the performance of feasibility studies, implemented projects, and potential benefits and beneficiaries (yr 3).
- Implement early stages of the most promising projects (yr 1-5).
- Pursue implementation of additional projects (yr 1-7).
- Support legislation that supports groundwater management by local agencies at the sub-basin level.

Surface Storage CALFED Agencies identified a list of twelve potential surface storage projects that are in varying stages of the environmental review or feasibility process. Actions taken in Stage 1 will focus on completing the necessary studies (technical work and environmental reviews) needed before implementing or proceeding with the six surface storage projects:

- In-Delta storage project (approximately 250 TAF). CALFED will evaluate leasing or purchasing the Delta Wetlands project, and will evaluate initiating a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible (Planning: yr 1-2, Construction: yr 3-7).
- Evaluate expanding CVP storage in Shasta Lake by approximately 300 TAF by raising the Shasta Dam by three to six feet (Planning: yr 1-4, Construction yr 6-7).
- Evaluate expanding Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros

Reservoir is subject to a number of mandates, agreements, and requirements in existing biological opinions. CALFED intends to work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are maintained (yr 1-7).

- Evaluate off-stream storage at Sites Reservoir, with a project capacity of up to 1.9 MAF (yr 1-5).
- Evaluate additional storage options in the upper San Joaquin River watershed. Consider additional storage capacity of between 250-700 TAF (yr 1-6).
- Evaluate enlarging Millerton Lake at Friant Dam or a functionally equivalent storage program in the region. The CALFED Program will join local partners to evaluate this project in Stage 1 (yr 1-6).

Power Facilities Re-operation Evaluation Evaluate the potential to re-operate some hydroelectric facilities to produce ecosystem benefits and water supply. The following ISI actions may be taken:

- Identify beneficiaries and negotiate cost sharing agreements (yr 1-7).
- Work with CALFED Agencies, the Public Utilities Commission, the SWRCB, the Federal Energy Regulatory Commission, and interested stakeholders to identify re-operation opportunities (yr 1-2).
- Develop environmental documentation on re-operation (yr 3-5).
- Perform feasibility studies and economic analyses (yr 3-5).
- Obtain permits, negotiate operating agreements, and seek site specific authorization including section 7 authorization. This may require design of facilities modifications to accommodate new operational priorities (yr 5-7).

Fish Migration Barrier Removal Evaluations To compliment ERP efforts to improve fish passage, the ISI Fish Migration Barrier Removal Program will identify obstructions, such as small dams, and consider modification or removal in order to restore anadromous fish access to critical upstream spawning and rearing habitat. The following actions will be taken:

- Work with CALFED Agencies, the SWRCB, local water agencies, and interested stakeholders to identify opportunities for modification or removal of obstructions such as small dams (yr 1-2).
- Develop environmental documentation (yr 3-5).
- Perform feasibility studies and economic analyses (yr 3-5).
- Obtain permits, negotiate agreements, and seek site specific authorization as required. This may require design on facilities modifications or removal actions. (yr 5-7).
- Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
- Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Conveyance

The CALFED Program will evaluate a through-Delta approach to conveyance based upon the existing Delta configuration with some modifications. The CALFED Program will evaluate the effectiveness of this conveyance approach, and add additional conveyance and/or other water management actions if necessary. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach to meet CALFED Program goals and objectives, consistent with the CALFED Program's Solution Principles. In the event of a finding that a through-Delta conveyance system is inadequate to achieve CALFED Program goals and objectives, additional actions may be implemented. The CALFED Program may also evaluate and pursue: 1) an isolated conveyance facility (a canal connecting the Sacramento River in the northern Delta to the SWP and CVP export facilities in the southern Delta); 2) source water blending or substitution; and/or 3) other actions through supplemental programmatic analysis.

As part of the Conveyance Program, the CALFED Program has incorporated the south Delta and north Delta regions to address conveyance improvements and related problems in Stage 1. Conveyance improvements for the South Delta set forth in the Final Programmatic EIR/EIS are identified as allowing SWP export capacity to increase from the current authorized levels with seasonal increases, as authorized in Corps Permit PN5820A. The proposed increases would allow up to 8,500 cfs pumping in 2003 and ultimately up to 10,300 cfs at the end of Stage 1. The EIR/EIS identifies a number of measures that will be part of the conveyance modifications including new fish screens, ecosystem restoration as part of the ERP, permanent operable barriers or their functional equivalent in selected South Delta channels, and other measures.

Improvements in export capabilities will be accompanied by associated operations which will maintain diversion capabilities for south Delta water users and provide for fish protection. CALFED implementing documents set forth a schedule for securing appropriate regulatory permits and completing a project-specific operations plan that addresses the potential impacts of increased pumping. This plan will need to reflect the nature and timing of the construction and operation of new project facilities and implementation of ecosystem improvements, and a more specific project description following completion of additional planning and environmental studies.

Decisions to implement conveyance actions will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual conveyance projects pursued under the WMS will fully evaluate all alternatives during tiered environmental review and will fully analyze and address direct and indirect effects under section 7 or section 10 of the ESA. Operational rules and facilities needed for use of additional export capability will be determined during ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements.

Proposed Conveyance Stage 1 Actions (South Delta)

The CALFED Program will evaluate the following Conveyance actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Conveyance Program.

- Pursue construction and evaluation of a 500 cfs test facility at the Tracy Pumping Plant to develop best available fish screening and salvage technology for the intakes to the SWP and CVP export facilities (yr 1-7).
- Pursue authorization for construction of a new screened intake for Clifton Court Forebay (CCFB) for the full export capacity of the SWP (yr 1-7).
- Implement the Joint Point of Diversion (JPOD) for the SWP and CVP (yr 1-7).
- Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. An intertie between Clifton Court Forebay and the Tracy Pumping Plant will be required if the export location is consolidated at Clifton Court Forebay and will be evaluated if exports continue at both locations. Also, evaluate and potentially implement an intertie between the projects downstream of the export pumps (yr 1-7).
- Evaluate increased SWP pumping by 500 cfs from July through September (yr 1-4).
- Facilitate interim SWP export flexibility up to 8,500 cfs, with appropriate environmental constraints including ESA requirements (yr 4).
- Obtain permits including ESA authorization to use full SWP capacity of 10,300 cfs, consistent with all applicable operational constraints, for water supply and environmental benefits (yr 7).
- For purposes of the project level environmental analysis for the South Delta Improvements, evaluate various operable barrier configuration alternatives or their functional equivalents. All barrier operations will be done in conjunction with water operations to avoid impacts to fish. Potential barriers include the installation of a permanent fish migration barrier at the Head of Old River, and the construction of three permanent flow control structures at Old River at Tracy, Middle River upstream of Victoria Canal, and at Grant Line Canal. The Grant Line Canal barrier would be constructed and operated in accordance with conditions and directions specified by the USFWS, CDFG, and NMFS. (yr 1-7).
- Monitor barrier effects on fish, stages, circulation, and water quality (yr 1-7).
- Evaluate the dredging of selected channel segments (yr 3-7).

Additional Actions Required During Stage 1 (South Delta)

- Implement south Delta ERP goals (yr 1-7).
- Consolidate, extend, and screen local agricultural diversions based on priority and initiate a screen maintenance program (yr 1-7).
- Develop a strategy to resolve regional water quality problems including actions to improve San Joaquin River DO conditions and the San Joaquin River drainage as described in the CALFED Program's WQP. Evaluate the feasibility of re-circulation of water pumped from the Delta by the CVP and SWP. If feasible, and consistent with the CALFED Program's ecosystem restoration goals and objectives, implement a pilot program (yr 1-7).

- Continue implementation of the Vernalis Adaptive Management Plan. Include development of a long-term plan describing actions of the San Joaquin River Group Authority to improve water management practices (yr 1-7).

Proposed North Delta Stage 1 Actions

- Evaluate and implement improved operational procedures for the Delta Cross Channel (DCC) to address fishery and water quality concerns (yr 1-4).
- Evaluate a screened through-Delta facility with a diversion capacity of up to 4,000 cfs on the Sacramento River to improve drinking water quality in the event the water quality program measures do not result in continuous improvement toward CALFED drinking water goals. This evaluation would consider the effectiveness of water quality measures and how to operate the DCC in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery. If the environmental review demonstrates that this diversion facility is needed to address drinking water quality concerns, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction may begin late in Stage 1 subject to section 7 authorization (yr 1-4).
- Evaluate opportunities to resolve local flood concerns and create tidal wetlands and riparian habitat by constructing new setback levees, improving existing levees, and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system. Any proposed channel modifications would be consistent with the CALFED Program's current direction on Delta conveyance and ecosystem goals (yr 1-7).
- Facilitate regionwide coordination of all CALFED Program related projects in the north Delta region (yr 1-7).

Proposed Stage 1 Actions Throughout the Delta Region

- Evaluate how water supplies can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and three parts per million (ppm) Total Organic Carbon (yr 1-7). This will include an equivalent level of investigation and studies on all of the actions which could be used to achieve the CALFED Program's targets.
- Evaluate the CALFED Program's progress toward measurable water quality goals and ecosystem restoration objectives, with particular emphasis on fish recovery (yr 6-7).
- Conduct additional environmental review to determine if construction of an isolated conveyance facility component of a dual Delta conveyance (presently not an element of the CALFED Program's Preferred Program Alternative) is warranted. A decision to construct such a facility would require separate environmental review and alternatives analysis that has not been done as part of the CALFED Program's programmatic analysis (yr 1-7).

Additional Actions Required During Stage 1 (Throughout the Delta Region)

- Fully implement actions, consistent with the MSCS, that mitigate for the direct and indirect environmental affects of project features and actions (yr 1-7).
- Improve flood control through levee improvements, levee setbacks, channel dredging, and floodplain restoration to be fully consistent with regional ERP actions (yr 1-7).
- Screen agricultural intakes to assure ecosystem protection (yr 1-7).

Environmental Water Account (EWA)

An essential goal of the CALFED Program is to provide increased water supply reliability to water users while at the same time assuring the availability of sufficient water to meet fish protection and restoration\recovery needs as one part of the overall ERP. As a means to achieve these objectives, the CALFED Program will provide commitments under the ESA and CESA to SWP and CVP export facilities only for the first four years of Stage 1. These commitments are based on fully providing water from existing regulatory means, a fully implemented EWA, flows and habitat restoration provided through the ERP, and the ability to obtain additional assets should they be necessary.

The EWA is a new water source provided to: (1) augment instream flows and Delta outflows; and (2) reduce Delta exports from CVP/SWP export facilities during key periods of fish and aquatic ecosystem concerns. The CALFED Agencies will also continue to work with other diverters in the Delta watershed to resolve local fishery-diversion conflicts based on the site-specific needs and opportunities for each diversion. The CALFED Agencies have crafted the EWA so that it has no effect on the existing water rights of other water right holders in the watershed.

Overall Purpose, Framework and Administration The EWA will be established, as part of the EWA Operating Principles Agreement (see Appendix B, hereby incorporated as part of this project description), to provide water for the protection and recovery of fish in addition to water available through existing regulatory actions related to project operations. The EWA Operating Principles Agreement will be interpreted to be consistent with this project description. To the extent that the EWA Operating Principles Agreement provides greater specificity, the EWA Operating Principles Agreement will be the controlling document.

The EWA will be funded jointly by the State and Federal governments and will be authorized to acquire, bank, transfer and borrow water and arrange for its conveyance. EWA assets will be managed by the State and Federal fish and wildlife agencies (the USFWS, NMFS, and CDFG) in coordination with project operators and stakeholders. Initial acquisition of assets for the EWA will be made by Federal and State agencies (Reclamation and DWR). Subsequently, it is anticipated that acquisitions may be made pursuant to a public process that may take advantage of other agencies or third parties to acquire assets.

Baseline Level of Protection DWR and Interior will provide a baseline of environmental protection. The CALFED Agencies recognize that the SWRCB may adjust the CVP and SWP

responsibilities for complying with the 1995 Delta Water Quality Control Plan (WQCP), as part of its on-going Bay-Delta Water Rights Hearings. The outcome of those hearings may affect the nature of this baseline. The CVP's and SWP's regulatory baseline, primarily for fish needs, identified as Tier 1 in the EWA discussion below, will include:

- **1993 Winter-run Salmon Biological Opinion (NMFS)**

- **1995 Delta Water Quality Control Plan (SWRCB)**

At this time, the CVP and SWP are responsible for meeting flow related objectives contained in this plan. The CALFED Agencies recognize that the SWRCB may adjust or re-allocate the responsibilities for meeting the 1995 Delta Water Quality Control Plan, as part of its ongoing Bay-Delta Water Rights hearings. Adjustment of responsibility to meet the Plan does not affect the baseline level of protection for purposes of the EWA.

Appropriate CALFED Agencies will develop a strategy to deal with the rare circumstances when the CVP obligation under the WQCP exceeds the 450 TAF annual cap for use of CVPIA Section 3406(b)(2) water. In the strategy, developed in conjunction with part of the Governor's Drought Contingency Plan, the Agencies will use their available resources to create an insurance policy to eliminate impacts to water users, while not adversely affecting other uses.

- **1995 Delta Smelt Biological Opinion (USFWS)**

The export curtailment contained in the 1995 Delta Smelt Biological Opinion (item 2 on page 19), commonly referred to as the "2 to 1 Vernalis flow/export ratio", will be met by Section 3406(b)(2) of the CVPIA and EWA. This objective calls for the SWP and CVP to reduce combined exports, below what is allowed in the 1995 Water Quality Control Plan during a 31-day period in April and May. The 1995 WQCP allows exports to be 100% of the base San Joaquin River flow at Vernalis during the April-May pulse period. The CVP reduction in pumping will be conducted pursuant to the accounting policy for Section 3406(b)(2) of the CVPIA and/or through reimbursement by the EWA. The SWP will be reimbursed by the EWA for its participation in reducing exports pursuant to the 2 to 1 Vernalis flow/export ratio.

The CVP and SWP will be operated pursuant to the terms of the San Joaquin River Agreement through 2011. While the SJRA is in effect, the exports may be reduced beyond what is called for by the 2 to 1 Vernalis flow/export ratio and San Joaquin River flows may be augmented by water acquired from upstream sources during that same time period. Such an augmentation will not be included as part of the SWP share of Vernalis flow. While operating per the SJRA, the SWP and CVP will also receive reimbursement from the EWA or pursuant to Section 3406(b)(2) for the additional curtailment. If the SJRA is not implemented for any reason, the operations will default back to the biological opinion operation, as per the terms of the SJRA.

- **Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in Accordance with Interior's October 5, 1999 Decision, clarified as follows:**

Water Resulting from Refill of Reservoirs ("Reset"): Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases ("reset") will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the "reset" provision.

Export Curtailments which Result in Increased Storage ("Offset"): Where a prescribed (b)(2) export curtailment results in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to south-of-Delta CVP contractors in the remainder of the water year. If such deliveries cannot be increased in that water year, such additional water stored in upstream reservoirs shall be available for other (b)(2) uses without charge. Where the delivery to export users in the remainder of the water year will not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

The Secretary of the Interior is expected to make a decision later this year on Trinity River flows, pursuant to the original Trinity authorization, the Trinity Restoration Act of 1984, and the CVPIA. The substance of the decision is unknown and therefore cannot be addressed at this time. It is separate and will not be affected by the ROD for the CALFED Program.

Other Environmental Protections The regulatory baseline above also assumes that other environmental protections contained in biological opinions, regulations or statutes remain in place. These protections include, without limitation, Level 2 refuge water supplies, as required by the CVPIA. The CVP will use its share of the benefits from joint point of diversion, to the extent available, to provide water required by its Level 2 refuge water supply mandates, but using such benefits will not create any limitation on the Level 2 supply available for refuges.

Operating Rules The ground rules for operating the EWA are detailed in the EWA Operating Principles Agreement, executed by DWR, Reclamation, CDFG, the USFWS, and NMFS. The ground rules are based on the principle that the EWA will provide flows allowing fish recovery while not resulting in uncompensated reductions in deliveries to south of Delta CVP/SWP contractors.

Asset Development Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in a following table, an initial one-time acquisition of 200 TAF of south-of-Delta storage or its functional equivalent will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries. This initial deposit will also provide

collateral for the first year's borrowing. The related storage is intended to function as long-term storage for other EWA assets as they become available.

Borrowing agreements will allow the EWA to borrow water from the CVP and SWP for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be shared. The limitations on borrowing will be developed as part of the agreement. Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries will not be affected by EWA operations. To provide regulatory stability during the initial period of Stage 1, the CALFED Agencies will provide a commitment, subject to legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP Delta exports resulting from measures to protect fish under the ESA and CESA. This commitment will be based on the availability of three tiers of assets:

Tier 1 is baseline water, provided by existing regulation and operational flexibility. The regulatory baseline consists of the biological opinions on winter-run salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP yield pursuant to CVPIA Section 3406(b)(2).

Tier 2 consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish over and above Tier 1, when needed without reducing deliveries to water users. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets as described subsequently.

Tier 3 is based upon the commitment and ability of the CALFED Agencies to make additional water available should it be needed. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, Tier 3 will be provided. In considering the need for Tier 3 assets, the fish and wildlife agencies will consider the views of an independent science panel. Although the CALFED Agencies do not anticipate needing access to Tier 3 water assets, the CALFED Agencies will prepare an implementation strategy for Tier 3 by August 2001, establish a timely scientific panel process, and identifying tools and funding should implementation of Tier 3 prove necessary.

Table 1. List of EWA assets. Some assets may be replaced by functional equivalents, if determined to be appropriate by the EWA Managing Agencies (USFWS, CDFG, NMFS)

Action Description	Water Available Annually(Average)
SWP Pumping of (b)(2)/ERP Upstream Releases¹	40,000 acre-feet ²
EWA Use of Joint Point³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta⁴	35,000 acre-feet
TOTAL	380,000 acre-feet
Storage acquisition	200,000 acre-feet of storage, filled when acquired in Year 1
Source-shifting agreement	100,000 acre-feet at any time

¹The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

²The amount of water derived from the first four actions will vary based on hydrologic conditions.

³The EWA will share access to joint point, with the CVP receiving 50% of the benefits.

⁴This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

Science Program

The CALFED Science Program includes implementing the Comprehensive Monitoring, Assessment, and Research Program (CMARP) as an integral aspect of the overall CALFED Program. The scope of the Science Program will encompass all elements of the CALFED Program: ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and levees integrity. The purpose of the Science Program is to provide new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the CALFED Program. The Science Program will build on the work of the Interagency Ecological Program (IEP) and other scientific efforts in the CALFED Program area.

The CALFED Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions, the effects of human stressors on ecosystem structure and function, and the ecological and other effects of individual CALFED Program

actions. Monitoring key system functions (or indicators), completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process.

In order to better integrate scientific review into the CALFED Program, the Governor and the Secretary of the Interior will appoint an independent science board to provide oversight and peer review for the overall program. Also, specific independent science panels may be convened as standing bodies or on an as needed basis. For example, the Science Program will assist with convening an independent science panel to review the implementation and operation of the EWA. In addition, the existing ERP Interim Science Board will likely become the ERP Science Panel, and provide ongoing independent review of the ERP.

The CALFED Science Program will accomplish the following in stage 1:

- Appoint an independent science board for the CALFED Program as a whole by the middle of 2001.
- Appoint an independent science panel for the EWA by the middle of 2001.
- Coordinate existing monitoring and scientific research programs.
- Refine the set of ecological, operational, and other predictive models that will be used in the evaluative process by the end of 2001.
- Establish performance measures and indicators, and a consistent strategy of on-going development of these, for each of the program areas.
- Develop an annual science report, format and content, which includes:
 - S Status of the species and effectiveness of efforts to improve conditions, including EWA, ERP and water management strategies, and provide recommendations to maximize fishery benefits while minimizing impacts to water supply.
 - S Assessment of progress and effectiveness of each program element as indicated by performance measures and indicators.
 - S Complete feasibility study to establish and construct CALFED Science Center
 - S Recommend research and/or program adjustments.
- Prepare first annual report by the end of 2001

CALFED intends to invest approximately \$ 300 million in the science program during stage 1.

Other Proposed Science Program Stage 1 Actions

In addition, the CALFED Program will evaluate the following Science Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions for the Science Program.

- Periodic review and refinement of the monitoring, data assessment and research plan from a long term perspective (yr 1-7).

- Periodic review and refinement of the monitoring, data assessment and research plan from a short term perspective which would include all elements of the Phase III, Stage 1 Program (yr 1-7).
- Help management define triggers and time periods which determine the need for a change in program direction (yr 1-7).
- Continue to develop and refine conceptual models to be used in evaluating actions undertaken by the programs. In keeping with the adaptive management format, the models will be continually updated with information generated by program actions (yr 1-7).
- Evaluate the effectiveness of the adaptive management process on the program decision making process (yr 1-7).
- Review the progress toward achieving overall CALFED Program goals and objectives and whether individual programs are progressing at similar paces (yr 1-7).
- Complete monitoring identified by the Diversion Effects on Fisheries Team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7).
- Design long-term, system wide, baseline monitoring with focused research to increase understanding of ecological processes and ways to reduce uncertainty; definition of needed studies is currently under development (yr 1-7).
- Provide available data on need to reduce bromides, total dissolved solids, total organic carbon, pesticides and heavy metals (yr 5).
- Provide available data on water quality in the south Delta and lower San Joaquin River (yr 1-7).
- Monitor and assess the impacts of water use efficiency measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).
- Prepare annual reports on status and progress, including such information as: performance of habitat restoration actions compared to expected results, summaries of any new information on the relative importance of various stressors, and any need for adjustments in actions or conceptual models (yr 1-7).
- Analyze status and need for adjustments of actions for later stages (yr 5-7).
- Monitor and report land use changes, such as agricultural land conversion, resulting from CALFED Program actions (yr 2-7).
- Hire an interim science leader and subsequently hire a chief scientist (yr 1-2).
- Appoint an Independent Science Board and an independent science panel for the EWA (yr 1-2).
- Coordinate existing monitoring and scientific research programs (yr 1-7).
- Refine the set of ecological, operational, and other predictive models that will be used in the evaluation process (yr 1-2).
- Establish and refine performance measures and indicators for each of the program areas (yr 1-7).

Multi-Species Conservation Strategy (MSCS)

The MSCS serves as a biological assessment for the CALFED Program and describes the CALFED Program strategy for achieving compliance with the ESA, CESA, and Natural Community Conservation Planning Act during implementation of the CALFED Program. As a biological assessment, it summarizes the CALFED Program and analyzes its effects on 244 listed, proposed, and candidate species, and species of concern. As a “conservation strategy” it outlines conservation goals for species that will be effected by the Program, and identifies strategies for achieving those goals and ESA compliance.

Conservation Goals and Prescriptions

The MSCS identifies conservation goals for 244 species as well as species prescriptions and conservation measures to achieve these goals. The CALFED Program has established a goal to recover 19 species, contribute to the recovery of 25 species, and maintain 200 species. A goal of “recovery” was established for those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh systems. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species long-term survival in nature is assured. Recovery is equivalent, at minimum, to the requirements for de-listing a species under ESA and CESA. With respect to anadromous salmonids within the MSCS Focus Area, recovery is equivalent, at a minimum, to completing the actions within the ERP Ecological Management Zones that are required for delisting a species under the federal and state ESAs. The goal “contribute to recovery” was assigned to species for which CALFED Program actions affect only a limited portion of the species’ range and/or CALFED Program actions have limited effects on the species. To achieve the goal of contributing to a species’ recovery, the CALFED Agencies are expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. The goal “maintain” was assigned to species expected to be minimally affected by CALFED Program actions. For this category, the CALFED Agencies will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species. Actions may not actually contribute to the recovery of the “maintain” species; however, at a minimum, they will be expected to not contribute to the need to list a species or degrade the status of a listed species. The CALFED Agencies will also, to the extent practicable, improve habitat conditions for these species.

Specific prescriptions were developed to achieve the conservation goals described above for each species. The prescriptions incorporate the measures identified in State and Federal recovery plans, where available, other relevant information, and professional judgment. Prescriptions include measures to enhance habitats and species and are not directly linked to the CALFED Program’s adverse impacts.

As the CALFED Program proceeds during the next 30 years, it is anticipated that California’s landscapes could change significantly and that new information will be available through research and monitoring. Consequently, species goals and prescriptions will likely change through time through adaptive management, and as new recovery plans are finalized or updated.

Framework for Federal Endangered Species Act Compliance

The CALFED Agencies will take actions necessary to meet the following conditions: 1) the fishery protections elements of the Program must be implemented as described in the EIS/EIR, including the ERP and EWA implementation and funding commitments; 2) Tier 3 measures must be provided, if and when needed; and, 3) implementation of the milestones must be demonstrated; and 4) the initial and annual assets of the EWA must be acquired for the EWA.

The program will be continuously monitored to ensure that it is implemented as intended and the elements necessary for regulatory commitments, i.e., conditions as described in the Conservation Agreement are implemented. In the event that information from monitoring or any other source indicates that any of the Program elements necessary for regulatory commitments are not being met or will not be met, notification will be provided, by the agency which developed the information, to the affected Agencies, as appropriate. Upon notification, the affected agencies will meet promptly to identify and assess measures which can be taken to remedy any noncompliance or anticipated noncompliance with the conditions, and will immediately implement measures. If NMFS determines that a situation of noncompliance exists and the affected agencies are unable to remedy noncompliance within a reasonable time period that NMFS prescribes, not to exceed 60 days, the regulatory commitments will be suspended or terminated. Upon a determination of noncompliance, formal consultation will be reinitiated and NMFS will issue a new or amended biological opinion with conditions prescribing alternative regulatory requirements. If the compliance with the conditions set out above is subsequently achieved, the initial regulatory commitments may be revised and reflected through new or amended programmatic biological opinions. Nothing described here will affect NMFS from exercising our regulatory authority.

The MSCS describes program-level strategies to achieve compliance with ESA, including strategies to address the indirect effects of actions taken under the CALFED Program, and strategies for completing tiered consultations, as appropriate. The CALFED Program's compliance strategies will, in part, be developed and implemented as part of future CALFED Program projects tiered from this programmatic biological opinion.

Entities implementing CALFED Program actions which may effect listed species will be required to develop Action Specific Implementation Plans (ASIPs). ASIPs will be developed for individual CALFED Program actions or groups of actions when enough detailed information is available about the actions to analyze fully their impacts on species and habitats, and develop appropriate measures to avoid, minimize, and compensate for impacts. Specifically, individual projects that qualify for consultation will be evaluated within the context of the program as a whole, which includes major elements designed to improve the environmental baseline and lead to the recovery of targeted species. These major elements will be subject to on-going monitoring, evaluation, and the application of adaptive management. Site specific biological opinions will take into account the environmental benefits that accrue from the CALFED Program.

Service Area Effects

Implementation of the CALFED Program's Preferred Program Alternative related to water supply reliability will be determined largely in an incremental fashion through an adaptive management process. Because of this, it is not possible to accurately estimate the scope of potential service area effects on species and habitats. Project-level or site-specific impacts may not be known until Phase III of the CALFED Program (implementation). Therefore, the CALFED Program strategy for addressing indirect effects in the service areas includes identifying a short-term strategy based on critical species needs for recovery and restoration, and a long-term strategy for dealing with impacts that cannot be predicted when the biological opinions are issued.

CALFED Agencies will use a two-step process to address potential service area effects that are currently unknown. First, CALFED Agencies will determine the potential presence and scope of any service area effects. Then, to address the effects it has identified, CALFED Agencies will integrate proactive, conservation planning approaches with specific conservation measures. To do this, CALFED Agencies will develop the four conservation measures listed below during Phase III. These measures, as described in the MSCS on pages 4-17 and 4-18, attempt to address these effects at the project level and at the program level.

- Providing technical assistance and other support to entities preparing Habitat Conservation Plans (HCPs) or conservation programs addressing effects of land use changes in the service areas.
- Evaluating each future water supply reliability program or project during planning and including appropriate measures to address indirect effects in the ASIPs. This may include implementing the applicable conservation measures already in the MSCS to conserve species relative to service area effects or developing new measures.
- Developing or contributing to conservation programs to address the critical needs of species in CALFED Program service areas not already covered by conservation plans.

Governance Plan

The interim governance structure will be in place from the time of the Programmatic ROD until a long-term permanent structure is adopted through State and Federal legislation. For interim governance, CALFED Agencies propose adoption of the current CALFED Program structure being used during the planning stage, but adapted for implementation. The interim governance structure, including identification of how decisions will be made, will be set forth in a new Implementation MOU which the agencies will develop and execute by the time of the ROD. The current structure is made up of the Policy Group reporting to the Governor of California and the Secretary of the Interior, public advisory groups, the CALFED Program Executive Director and staff, and State and Federal agencies and teams. This structure, with additions and modifications, will serve to bridge the gap until a permanent commission is established.

Interim Program Management Responsibilities The LSIP management will remain with DWR, CDFG, and other existing agencies. The CALFED Program will continue to manage the ERP, in

coordination with the appropriate agencies. The State and Federal fish and wildlife agencies (CDFG, USFWS, NMFS) will manage the EWA assets, in coordination with the ERP and water project operations (Reclamation and DWR). CALFED Program will be assigned program management for the WP. The CALFED Program and appropriate agencies (such as Reclamation, EPA, DHS, DWR, and SWRCB) will manage the WQP. For the WTP, CALFED Program will provide program direction, oversight, and coordination among CALFED Program areas and among agencies with jurisdiction over water transfers and use of project facilities. Agencies with jurisdiction over water transfers would retain authority to implement any changes in their own policies or procedures. DWR, Reclamation, and CALFED Program will manage the WUEP. DWR, Reclamation, and CALFED Program will manage the Storage Program Element. Reclamation and DWR will manage the Conveyance Program element. CALFED Program will manage the Science Program (as consistent with the Implementation MOU).

Milestones

Milestones are a list of ERP, MSCS, and WQP actions the CALFED Program will fully implement in Stage 1 to address covered species. Milestones are a subset of the ERP actions the fish and wildlife agencies expect will be implemented in Stage 1, to achieve the Program's conservation goals. The complete list of milestones appears in Appendix C. A full description of the function and significance of the milestones to this consultation is included in the Appendix.

The Program's objectives for ecosystem restoration are to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse plants and animal species. The ERP, MSCS, and WQP are the principal Program elements designed to meet these objectives. Implementation of the ERP will be informed by the Science Program, which will conduct pertinent research, and monitor and evaluate the implementation of ERP, MSCS, and WQP actions. The ERP, MSCS, WQP, and the Science Program are directly relevant and important for FESA, CESA and NCCPA compliance. To ensure that the ERP, MSCS, and WQP are implemented in a manner and to an extent sufficient to sustain programmatic FESA, CESA and NCCPA compliance for all Program elements, the USFWS, NMFS and CDFG (fish and wildlife agencies) have developed Milestones for ERP, MSCS, and WQP implementation. The Milestones include Science Program actions that are relevant for ERP, MSCS, and WQP implementation. The fish and wildlife agencies have concluded that the Milestones, if achieved along with expected additional ERP actions, define an adequate manner and level of ERP, MSCS, and WQP implementation for Stage 1.

The ERP, MSCS, and WQP are the Program's blueprint for the restoration of the Bay-Delta. The MSCS is not a separate blueprint or supplemental restoration program and does not supplant the ERP. The measures and goals in the MSCS are consistent with the ERP's measures and goals. However, the MSCS is a conservation strategy and a regulatory compliance strategy for the entire Program. The MSCS addresses the potential adverse effects and beneficial effects of all Program actions, including ERP actions and other Program actions such as levee system integrity actions, water conveyance actions and storage actions. Based in large part on the ERP, the MSCS' premise is that the Program as a whole, including all Program elements, will improve and increase

aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The ERP therefore serves two purposes: 1) to achieve Program objectives for ecosystem restoration and species recovery, and 2) to enable actions from all Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

To serve both of these purposes, ERP implementation must be informed both by the best available scientific information and by information about the implementation of other Program actions. Information about the implementation of other Program actions is necessary to ensure that they do not conflict or limit the success of the ERP. In addition, ERP restoration actions must be implemented concurrent, and at a commensurate level, with the implementation of other Program actions to ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The Milestones are intended to establish, based on the best information currently available, a group of actions derived from the ERP, MSCS, and WQP that 1) establish an adequate level of implementation during Stage 1, 2) would not be inhibited by proposed Stage 1 actions in other Program elements, and 3) would enable proposed Stage 1 actions in other Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

The Program's development of annual, near-term, and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, the MSCS, FESA recovery plans, and implementation plans developed for specific ecological management zones, and will be informed by the Science Program. The Milestones represent the MSCS' goals and objectives with respect to the ERP. As with ERP implementation priorities and strategies generally, the fish and wildlife agencies intend that the Science Program will provide information concerning the Milestones. Specifically, the fish and wildlife agencies will seek review within the Science Program of 1) whether other Program elements conflict with implementation priorities and strategies so as to limit the success of the ERP, MSCS, and WQP, and 2) whether the implementation priorities and strategies will ensure that the Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. As the Science Program develops information about implementation, the USFWS, NMFS and CDFG will revise the Milestones as necessary, consistent with the FESA and the NCCPA.

The CALFED Program will develop annual ERP implementation plans using the ERP Strategic Plan for Ecosystem Restoration and the MSCS. Members of the Science Program, the Agency/Stakeholder Ecosystem Team ("ASET") the CALFED Program will work cooperatively to develop annual ERP implementation plans and to define the long-term priorities for the ERP. The fish and wildlife agencies will participate fully in the process for developing annual ERP implementation plans. The fish and wildlife agencies' participation will include, but not be limited to, participation in the ASET. Through participation in the annual ERP implementation plan process, the fish and wildlife agencies will help ensure 1) that each plan is based on the best available information regarding ecosystem restoration and the Bay-Delta system, 2) that each plan will achieve substantial progress toward meeting the Milestones, and 3) that the Science Program will provide information to achieve applicable Milestones. As new information becomes available and conceptual models are tested and refined as part of this process, the fish and

wildlife agencies anticipate that priorities reflected in the Milestones may change, and that new issues or questions may emerge. Through the annual ERP implementation process, Science Program members, the CALFED Program, and ASET members may propose revisions to the Milestones based on pertinent new information. If the fish and wildlife agencies determine that the proposed revisions are warranted and are consistent with FESA and the NCCPA, the Fish and wildlife agencies will revise the Milestones accordingly.

The Fish and wildlife agencies will not approve revisions to the Milestones that would cause or allow an effect to Covered Species or critical habitat designated under FESA that was not considered in the programmatic regulatory determinations, or would otherwise require the re-initiation of consultation under 50 CFR §402.16. Consequently, the USFWS and NMFS expect that their approved revisions to Milestones can be incorporated in each agency's programmatic biological opinions without re-initiating consultation under §7 of FESA. CDFG will incorporate its approved revisions to the Milestones by amending the CDFG Approval and Supporting Findings for the MSCS.

It will not be possible to gauge the progress of Milestone implementation for a few years, once Phase III begins. Consequently, over the first four years the Wildlife Agencies will base success of Program Implementation upon the criterion that the ERP is fully funded (at least \$150 million from dedicated funding sources annually through Stage 1 for the ERP, and an additional \$50 million EWA funding annually for the first four years). However, the criterion for success at the end of Stage 1 will be implementation of the Stage 1 Milestones.

The Program will submit an annual report to the Governor, the Secretary of the Interior, the State Legislature and the Congress that describes the status of implementation of all Program elements by December 15 of each calendar year. The report will document the status of all actions taken to meet Program objectives in Stage 1. Among the actions addressed in the report will be the completion of key projects and milestones identified in the ERP. Progress in achieving the ERP-MSCS Milestones will be included in the portion of the annual reports concerning the ERP.

Summary of Key Planned Actions

If key program actions are not implemented at this programmatic level, or new information becomes available, consultation would be reinitiated at the programmatic level to ascertain how the lack of implementation of any actions, or new information, effects the evaluation of effects upon listed species associated with the overall implementation of the suite of actions being considered and the subsequent conclusions made in this biological opinion. The following key actions are considered relevant to this biological opinion and part of the project description and, are therefore, requisite in conducting the effects analysis:

Program-wide

1. The conservation actions described in the Description of the Proposed Action will be implemented, including, but not limited to, the ERP Plan, the WQP Plan, the WP Plan, and

the MSCS and, where applicable, its strategy for addressing indirect, service area effects. The determination of whether and to what extent a specific action results in indirect effects will be made on a case by case basis in accordance with legal requirements. These actions will be implemented consistent with the Science Program and adaptive management, as described in the **Description of the Proposed Action**.

2. CALFED Agencies will obtain funding sufficient to implement the conservation elements and strategies, as necessary, to implement this biological opinion.
3. The various CALFED Program elements, strategies, and projects will be implemented in concert with the ERP, MSCS, EWA, and WQP to achieve the multiple goals of the CALFED Program. The CALFED programs will be implemented such that the net effects to species and their habitats are positive and are consistent and in conformance with State and Federal recovery goals.
4. To the extent that a CALFED action is not subject to Section 7 of the ESA and is likely to result in the take of listed species, a permit under section 10 of the ESA will be required
5. The CALFED Program will utilize comprehensive monitoring and adaptive management to assess projects and programs.
6. The CALFED Program will implement projects to achieve the milestones (Appendix C) established for the ERP, MSCS, and WQP.
7. Discharges into surface water bodies and waterways resulting from CALFED Program actions will comply with the standards set forth in the Description of the Proposed Action for the biological opinion on the Environmental Protection Agency's Promulgation of Numeric Criteria for Priority Toxic Pollutants for the State of California; California Toxics Rule (CTR) (USFWS File No. 1-1-98-F-21), in accordance with applicable implementation plans.
8. Entities implementing CALFED Program actions will comply with all applicable environmental laws.
9. DWR, to the extent required by law, and Reclamation will consult on all new and modified water contracts from a CALFED Program action that may affect listed species.

Levee System Integrity Program

10. Levee integrity improvement elements will be consistent with ERP actions and MSCS conservation measures, so that levee integrity and ecosystem and species recovery advance simultaneously.

11. The USFWS, NMFS, and CDFG will be involved in planning Levee System Integrity Program projects to ensure that ERP implementation is not impaired by levee program actions and adverse effects of levee actions are fully mitigated.
12. Development and implementation of CALFED Program plans for rehabilitating Suisun Marsh levees will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans.
13. Levee repair/improvements will be constructed using levee set-backs and soft-fixes (bio-technical solutions) to the extent practicable.

Water Quality Program

14. The CALFED Program will implement projects to achieve the milestones established for the WQP in Stage 1.

Ecosystem Restoration Program

15. The CALFED Program will implement projects to achieve the milestones established for the ERP in Stage 1.
16. The ERP will be implemented in a manner that will achieve species prescriptions and recovery goals of covered species by year 30 of the CALFED Program. Stage 1 milestones establish the trajectory for achieving recovery goals for the first 7 years.

Water Use Efficiency Program

17. Development and implementation of the WUEP will be consistent with the goals and objectives of the ERP and MSCS, including State and Federal recovery plans. Program actions and associated conservation measures will be planned in conjunction with the USFWS, NMFS, and CDFG, in compliance with FESA, CESA, and NCCPA, as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program).

Water Transfers Program

18. No water transfers resulting from CALFED Program actions will occur if they would result in adverse effects on fish and wildlife until consultation under section 7 is completed or section 10 permit is issued. Reclamation and DWR will consult on all proposed 3rd party water transfers that may affect listed species and their native habitats, as appropriate. Additionally, the EWA will not be charged for curtailed 3rd party transfer opportunities.

19. EWA, CVP, and Level 4 Refuge water supply transfers will have priority for conveyance over other transfer obligations (as consistent with the Operating Principles Agreement for the EWA).

Watershed Program

20. Development and implementation of the Watershed Program will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans. Program actions will be planned in conjunction with the USFWS, NMFS, and CDFG, in compliance with FESA, CESA, and NCCPA, as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program). Program actions will be funded so that it is assured that appropriate conservation measures for listed species will be included in program actions, as appropriate.

Water Management Strategy

Specific key actions are provided for storage, conveyance, EWA, and other programs.

Storage

21. Storage sites will be selected through a screening process which includes applicable environmental requirements.
22. Following the initiation of consultation, CALFED Agencies will comply with section 7(d) of the ESA, which prohibits making any irreversible or irretrievable commitment of resources, for any potential new storage site or modified storage site prior to achieving project-specific compliance under section 7(a)(2) of the ESA.
23. Tiered project specific analyses of potential storage improvements will identify and result in the selection of alternatives that are capable of being mitigated with appropriate mitigation sites and operational requirements; where the compensatory mitigation is highly likely to be successful; with the project specific compensatory mitigation implemented concurrent with, or in advance of, the adverse effects associated with construction and implementation of the project; where construction and operation of the project will not result in jeopardy to listed or proposed species or adverse modification of critical habitat; and where the project will not result in substantial degradation of the aquatic environment.
24. Conveyance structures (e.g., canals, pipelines), recreation, roads, and similar developments associated with or proposed in conjunction with proposed expansions of existing storage facilities or proposed new storage facilities will be evaluated thoroughly for their impacts to Federal or State listed species and those species evaluated consistent with the MSCS, as appropriate. If, through the informal or formal consultation process, it is determined by the USFWS, NMFS, and CDFG (for State listed species) that project-related impacts would threaten the long-term viability of Federal or State listed species or

those species evaluated under the MSCS, the proposed project(s) will be modified or dropped from consideration.

Conveyance

25. To the extent consistent with the Service's regulatory authority, any CALFED agency that proposes to develop water for delivery or application outside current contract service areas would comply with ESA requirements under section 7 or 10, as appropriate, if listed species may be affected.
26. In proceeding with the South Delta Improvement Program, CALFED Agencies shall implement ecosystem restoration in the lower San Joaquin river and south Delta (generally, south of Empire Cut) in advance of or concurrent with impacts resulting from south Delta facility improvements.
27. When the CDFG, NMFS and Service, in consultation with the CALFED Agencies, determine that a diversion requires screening, CALFED Agencies will secure written agreements from willing land owners to allow access for screening of agricultural and municipal diversions to protect fish consistent with the screening priorities established by the CALFED Program. The agreement will provide that if monitoring is necessary, access for monitoring will be allowed with reasonable notification. If the CALFED Program is not substantially achieving screening program objectives, the CALFED Agencies will reinitiate informal or formal consultation.
28. When implementing EWA export reductions, the water cost associated with decreased exports will be charged against current facilities capabilities as constrained by current regulation. Any future increases in exports resulting from CALFED conveyance improvements will have operational rules developed through consultation with the fish and wildlife agencies to ensure consistency with EWA Operating Principles, and the goals of restoration and recovery for aquatic species.
29. In the interim, prior to installation of permanent operable barriers, DWR will apply for and obtain permits to allow the continued operation of the temporary barriers.
30. Prior to increasing pumping above current authorized levels, operational rules for use of additional export capability will be determined through an open CALFED process and ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements. To offset potential impacts and to provide for recovery of fishery populations, additional measures will be developed which would allow for protection of fish. These additional measures may include, which are phased over time, but are not limited to (a) screening, (b) new standards which limit the timing and magnitude of exports and water supply releases at key periods of fish concern, or (c) a combination of the two. ESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this opinion.

31. An isolated conveyance facility will be evaluated as an alternative in the event it is determined that a through-Delta system will not accomplish the CALFED Programs' goals for restoration and recovery of listed species, or its WQP goals. The study will be developed through a peer-review process to ensure objective analysis.

EWA

32. All EWA fixed assets (i.e., purchases) are acquired each year.
33. The EWA Operational Principles Agreement is signed and fully implemented.
34. The project agencies shall request clarification with the USFWS, CDFG and NMFS on any points that appear to be ambiguous related to fishery actions for the EWA.
35. If EWA assets are depleted and the USFWS, NMFS, and CDFG determine Tier 3 is necessary, Tier 3 assets will be available to protect fish.
36. As new water storage and conveyance projects are being planned, potential fishery impacts will be assessed. If necessary, to offset potential impacts and to provide for recovery of fishery populations, operational rules will be developed which would allow for protection of fish. These operational rules may include but not limited to (a) limits on the timing and magnitude of exports and water supply releases at key periods of fish concern, and (b) new sharing formulae to increase EWA assets, which would allow the EWA to offset impacts and implement restoration actions. ESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this opinion, as appropriate.

Science Program

37. The Science Program will complete annual reports describing program progress and compliance of all CALFED program actions within this biological opinion.

Multi-Species Conservation Strategy

38. CALFED agencies will consult with NMFS or request technical assistance, as appropriate, to determine whether any future CALFED Program actions (including water transfers and permanent assignment of water) may affect listed or proposed species before signing a ROD or a FONSI which is tiered from the PEIS. This determination will consider both direct and indirect effects, if any, of specific actions. Evaluation of whether and to what extent the specific action results in indirect effects will be made on a case by case basis in accordance with legal requirements.

39. The list of evaluated species will be reviewed and revised periodically by the USFWS, NMFS, and CDFG to add and remove species, as appropriate, and to review the recovery objective (R, r, or m) for species for their appropriateness.
40. NMFS will work closely with other CALFED agencies, water users and others, providing them with maps of listed species habitats within service areas. NMFS will guide entities through the consultation process or provide technical assistance, as appropriate, to address project-specific effects.
41. Entities implementing CALFED Program actions will complete tiered, project-specific consultation with the USFWS, NMFS, and CDFG, as appropriate, through completion of ASIPs, as described in the MSCS.
42. The CALFED agencies will closely coordinate with the USFWS, NMFS, and CDFG during development and implementation of all ASIPs.
43. To the extent that the CALFED Program actions result in changes to land use practices and the impact analysis required by the MSCS shows effects to listed species, ESA, CESA and NCCPA compliance, as appropriate, will occur. The strategy for addressing impacts as described in the MSCS includes appropriate tools such as: (1) assisting with or contributing to completion and implementation of HCPs that address service area effects, as described in section 10(a) of the ESA; (2) including measures to address indirect effects in ASIPs and completing project-specific section 7 consultations on the ASIPs; (3) contributing towards or developing and implementing a conservation program that addresses species critical needs; and implementing the applicable conservation measures, relative to service area impacts, already in the MSCS.
44. The CALFED Program will monitor the baselines of the species addressed in this opinion. Monitoring (for the life of the CALFED Program's Preferred Program Alternative) will be implemented immediately to test and track the CALFED Program's objective that species' baseline's are stable or increasing.
45. Any project-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect, and the CALFED agencies shall be adequately funded and staffed to complete tiered project-specific consultations from this opinion and track implementation of conservation actions.

II. Status of Listed Species and Critical Habitat

The **Sacramento River winter-run chinook salmon** (*Oncorhynchus tshawytscha*) are listed as endangered under the ESA (January 4, 1994, 50 FR 440). This Evolutionarily Significant Unit¹ (ESU) consists of the Sacramento River population in California's Central Valley. Designated critical habitat for Sacramento River winter-run chinook salmon includes the waterways, bottom, and water of the waterways and adjacent riparian zones of the Sacramento River from Keswick Dam, Shasta County (RM 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (June 16, 1993, 58 FR 33212). This critical habitat designation includes the river water, river bottom (including those areas and associated gravel used by winter-run chinook salmon as a spawning substrate), and the adjacent riparian zone used by fry and juveniles for rearing. In areas westward from Chipps Island, including San Francisco Bay to the Golden Gate Bridge, it includes the estuarine water column, essential foraging habitat, and food resources used by the winter-run chinook salmon as part of their juvenile out-migration or adult spawning migration.

Central Valley spring-run chinook salmon (*O. tshawytscha*) are listed as threatened under the ESA (September 16, 1999, 64 FR 50394). This ESU consists of spring-run chinook salmon occurring in the Sacramento River Basin. Designated critical habitat for Central Valley spring-run chinook salmon includes all river reaches accessible to listed chinook salmon in the Sacramento River and its tributaries in California, except for reaches on Indian lands. Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (February 16, 2000, 65 FR 7764). This above critical habitat designation include all waterways, substrate, and adjacent riparian zones. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); and (3) Indian tribal lands.

Central Valley steelhead (*O. mykiss*) are listed as threatened under the ESA (March 19, 1998, 63 FR 13347). This ESU consists of steelhead populations in the Sacramento and San Joaquin River Basins in California's Central Valley. Designated critical habitat for Central Valley steelhead includes all river reaches accessible to listed steelhead in the Sacramento and San Joaquin rivers and their tributaries in California, except for reaches on Indian lands. Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez

¹For purposes of conservation under the Endangered Species Act, an Evolutionarily Significant Unit (ESU) is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples 1991).

Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years); (3) Indian tribal lands; and (4) areas of the San Joaquin River upstream of the Merced River confluence (February 16, 2000, 65 FR 7764).

Central California Coast steelhead (*O. mykiss*) were listed as threatened by NMFS on August 18, 1997 (62 FR 43937). This ESU includes all naturally-produced steelhead (and their progeny) in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun, San Pablo, and San Francisco Bays. Critical habitat was designated for the Central California Coast steelhead ESU on February 16, 2000 (65 FR 7764), and includes all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Russian River to Aptos Creek, California (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays. Also included are all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay to the Golden Gate Bridge. Excluded are areas above specific dams or above longstanding naturally impassable barriers

Following are descriptions of the general life histories and population trends of listed species that may be directly or indirectly affected by the proposed action.

A. Chinook Salmon

1. General Life History

Chinook salmon historically ranged from the Ventura River in southern California north to Point Hope, Alaska, and in northeastern Asia from Hokkaido, Japan to the Anadyr River in Russia (Healey 1991).

Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Healey (1986) described 16 age categories for chinook salmon, 7 total ages with 3 possible freshwater ages. Two generalized freshwater life-history types were described by Healey (1991): “stream-type” chinook salmon reside in freshwater for a year or more following emergence, whereas “ocean-type” chinook salmon migrate to the ocean within their first year.

Chinook salmon mature between 2 and 6+ years of age (Myers *et al.* 1998). Freshwater entry and spawning timing are generally thought to be related to local water temperature and flow regimes (Miller and Brannon 1982). Runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning (Myers *et al.* 1998). Spring-run chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and finally spawn in the late summer and early autumn. Fall-run chinook salmon enter freshwater at an

advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

Central Valley spring-run chinook salmon adults are estimated to leave the ocean and enter the Sacramento River from March to July (Myers *et al.* 1998). Spring-run chinook spawning typically occurs between late-August and early October with a peak in September. Spawning typically occurs in gravel beds that are located at the tails of holding pools (USFWS 1995). Eggs are deposited within the gravel where incubation, hatching, and subsequent emergence takes place. The upper preferred water temperature for spawning adult chinook salmon is 55E F (Chambers 1956) to 57E F (Reiser and Bjornn 1979). Length of time required for eggs to develop and hatch is dependant on water temperature and is quite variable. In Butte and Big Chico creeks, emergence of spring-run chinook typically occurs from November through January. In Mill and Deer creeks, colder water temperature delay emergence to January through March (CDFG 1998).

Post-emergent fry seek out shallow, nearshore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and aquatic crustaceans. In Deer and Mill creeks, juvenile spring-run chinook usually spend 9-10 months in their natal streams, although some may spend as long as 18 months in freshwater. Most “yearling” spring-run chinook move downstream in the first high flows of the winter from November through January (USFWS 1995; CDFG 1998). In Butte and Big Chico creeks, spring-run chinook juveniles typically exit their natal tributaries soon after emergence during December and January, while some remain throughout the summer and exit the following fall as yearlings. In the Sacramento River and other tributaries, juveniles may begin migrating downstream almost immediately following emergence from the gravel with emigration occurring from December through March (Moyle, *et al.* 1989; Vogel and Marine 1991). Fry and parr may spend time rearing within riverine and/or estuarine habitats including natal tributaries, the Sacramento River, non-natal tributaries to the Sacramento River, and the Delta.

Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (Myers *et al.* 1998). Fisher (1994) reported that 87 percent of returning spring-run adults are three-years-old based on observations of adult chinook trapped and examined at Red Bluff Diversion Dam between 1985 and 1991.

Adult Sacramento River winter-run chinook salmon leave the ocean and migrate through the Sacramento-San Joaquin Delta to the upper Sacramento River from December through June. Spawning generally occurs between mid-April and July, and occasionally into early August. The majority of winter-run chinook salmon spawning occurs upstream of Red Bluff Diversion Dam in the vicinity of Redding, California. The eggs are fertilized and buried in the river gravel where they incubate and hatch in approximately a two-month period.

Emergence of the fry from the gravel begins during early July and continues through September. Fall and winter emigration behavior by juveniles varies with streamflow and hydrologic conditions. Most juveniles redistribute themselves to rear in the Sacramento River through the fall and winter months. Some winter-run chinook salmon juveniles move downstream to rear in the

lower Sacramento River and Delta during the late fall and winter. Smolting and ocean entry typically occurs between January and April.

2. Population Trends - Sacramento River Winter-run Chinook Salmon

Historically, the winter run chinook salmon was abundant in the McCloud, Pit, and Little Sacramento rivers. Construction of Shasta Dam in the 1940s eliminated access to all of the historic spawning habitat for winter-run chinook salmon in the Sacramento River Basin. Since then, the ESU has been reduced to a single spawning population confined to the mainstem Sacramento River below Keswick Dam; although some adult winter-run chinook have been observed in Battle Creek, tributary to the upper Sacramento River, in recent years. The fact that this ESU is generally comprised of a single population with very limited spawning and rearing habitat increases its risk of extinction due to local catastrophe or poor environmental conditions. There are no other natural populations in the ESU to buffer it from natural fluctuations.

Quantitative estimates of run-size are not available for the period prior to the completion of Red Bluff Diversion Dam in 1966. CDFG estimated spawning escapement of Sacramento River winter-run chinook salmon at 61,300 (60,000 mainstem, 1,000 in Battle Creek, and 300 in Mill Creek) in the early 1960s, but this estimate was based on “comparisons with better-studied streams” rather than actual surveys. During the first 3 years of operation of the counting facility at Red Bluff Diversion Dam (1967-1969), the spawning run of winter-run chinook salmon averaged 86,500 fish. From 1967 through the mid-1990's, the population declined at an average rate of 18 percent per year, or roughly 50 percent per generation. The population reached critically low levels during the drought of 1987-1992; the 3-year average run size for period of 1989 to 1991 was 388 fish. However, the trend in the past 5 years indicates the population may be recovering. The most recent 3-year (1997-1999) average run-size was 2,220 fish.

Additional historical and recent published chinook salmon abundance information are summarized in Myers *et al.* (1998).

3. Population Trends - Central Valley Spring-run Chinook Salmon

Historically, spring-run chinook salmon were predominant throughout the Central Valley, occupying the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers, with smaller populations in most other tributaries with sufficient habitat for over-summering adults (Stone 1874; Rutter 1904; Clark 1929). The Central Valley drainage as a whole is estimated to have supported spring-run chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). Before the construction of Friant Dam, nearly 50,000 adults were counted in the San Joaquin River (Fry 1961). Following the completion of Friant Dam, the native population from the San Joaquin River and its tributaries was extirpated. Spring-run chinook salmon no longer exist in the American River due to the existence and operation of Folsom Dam.

Natural spawning populations of Central Valley spring-run chinook salmon are currently restricted to accessible reaches in the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998; USFWS, unpublished data). With the exception of Butte Creek and the Feather River, these populations are relatively small ranging from a few fish to several hundred. Butte Creek returns in 1998 and 1999 numbered approximately 20,000 and 3,600, respectively (CDFG unpublished data). On the Feather River, significant numbers of spring-run chinook, as identified by run timing, return to the Feather River Hatchery. However, coded-wire-tag information from these hatchery returns indicates substantial introgression has occurred between fall-run and spring-run chinook populations in the Feather River due to hatchery practices.

Additional historical and recent published chinook salmon abundance information are summarized in Myers *et al.* (1998).

C. Steelhead

1. General Life History

Steelhead exhibit perhaps the most complex suite of life history traits of any species of Pacific salmonid. They can be anadromous or freshwater resident. Resident forms are usually called rainbow trout. Winter steelhead generally leave the ocean from August through April, and spawning occurs between December and May (Busby *et al.* 1996). The timing of upstream migration is generally correlated with higher flow events and associated lower water temperatures. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al.* 1996). However, it is rare for steelhead to spawn more than twice before dying; most that do so are females (Busby *et al.* 1996; Nickelson *et al.* 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby *et al.* 1996).

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may be used for spawning (Barnhart 1986; Everest 1973). The length of the incubation period for steelhead eggs is dependant on water temperature, dissolved oxygen concentration, and substrate composition. In late spring and following yolk sac absorption, alevins emerge from the gravel as fry and begin actively feeding in shallow water along perennial stream banks (Nickelson *et al.* 1992).

Summer rearing takes place primarily in higher velocity areas in pools, although young-of-the-year are also abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson *et al.* 1992). Juveniles feed on a wide variety of aquatic and terrestrial insects (Chapman and Bjornn 1969), and emerging fry are sometimes preyed upon by older juveniles. Juveniles live in freshwater from one to four years (usually two years in the California) (Barnhart 1986), then smolt and migrate to the sea from

February through April. Although some steelhead smolts may outmigrate during the fall and early winter months.

California steelhead typically reside in marine waters for one to two years prior to returning to their natal stream to spawn as three- or four-year olds (Busby *et al.* 1996).

2. Population Trends - Central Valley steelhead

Central Valley steelhead once ranged throughout most of the tributaries and headwaters of the Sacramento and San Joaquin basins prior to dam construction, water development, and watershed perturbations of the 19th and 20th centuries (McEwan and Jackson 1996; CALFED 2000). In the early 1960s, the California Fish and Wildlife Plan estimated a total run size of about 40,000 adults for the entire Central Valley including San Francisco Bay (CDFG 1965). The annual run size for this ESU in 1991-92 was probably less than 10,000 fish based on dam counts, hatchery returns and past spawning surveys (McEwan and Jackson 1996).

At present, all Central Valley steelhead are considered winter-run steelhead (McEwan and Jackson 1996), although there are indications that summer steelhead were present in the Sacramento River system prior to the commencement of large-scale dam construction in the 1940's (IEP Steelhead Project Work Team 1999). McEwan and Jackson (1996) reported wild steelhead stocks appear to be mostly confined to upper Sacramento River tributaries such as Antelope, Deer, and Mill creeks and the Yuba River. However, naturally spawning populations are also known to occur in Butte Creek, and the upper Sacramento mainstem, Feather, American, Mokelumne, and Stanislaus rivers (CALFED 2000). It is possible that other naturally spawning populations exist in Central Valley streams, but are undetected due to lack of monitoring and research programs. The recent implementation of new fisheries monitoring efforts has found steelhead in streams previously thought not to contain a population, such as Auburn Ravine, Dry Creek, and the Stanislaus River (IEP Steelhead Project Work Team 1999).

3. Population Trends - Central California Coast steelhead

Only two estimates of historic (pre-1960s) abundance specific to this ESU are available: an average of about 500 adults in Waddell Creek in the 1930s and early 1940s (Shapovalov and Taft 1954), and 20,000 steelhead in the San Lorenzo River before 1965 (Johnson 1964). In the mid-1960s, 94,000 adult steelhead were estimated to spawn in the rivers of this ESU, including 50,000 fish in the Russian River and 19,000 fish in the San Lorenzo River (CDFG 1965). Recent estimates indicate an abundance of about 7,000 fish in the Russian River (including naturally-produced steelhead) and about 500 fish in the San Lorenzo River. These estimates suggest that recent total abundance of steelhead in these two rivers is less than 15 percent of their abundance in the mid 1960s. Recent estimates for several other streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vicente Creek, Soquel Creek, and Aptos Creek) indicate individual run sizes of 500 fish or less. Steelhead in most tributaries to San Francisco and San Pablo bays have been virtually extirpated (McEwan and Jackson 1996). Fair to good runs of

steelhead still apparently occur in coastal Marin County tributaries. In a 1994 to 1997 survey of 30 San Francisco Bay watersheds, steelhead occurred in small numbers at 41 percent of the sites, including the Guadalupe River, San Lorenzo Creek, Corte Madera Creek, and Walnut Creek (Leidy 1997). Presence/absence data available since the proposed listing show that in a subset of streams sampled in the central California coast region, most contain steelhead (Adams et al. 1999). While there are several concerns with these data (e.g., uncertainty regarding origin of juveniles), NMFS believes it is generally a positive indicator that there is a relatively broad distribution of steelhead in smaller streams throughout the region.

Little information is available regarding the contribution of hatchery-produced fish to natural spawning of steelhead, and little information on present run sizes or trends for this ESU exists. However, given the substantial rates of declines for stocks where data do exist, the majority of natural production in this ESU is likely not self-sustaining (62 FR 43937).

Generally, life history characteristics and habitat requirements for Central California Coast steelhead are similar to those described for Central Valley steelhead. However, Central California Coast steelhead typically migrate shorter distances and spawn in smaller, rainfall-fed streams compared to the larger, snowmelt-fed spawning streams and rivers occupied by Central Valley steelhead. Adult Central California Coast steelhead spawn in tributaries to San Francisco, San Pablo, and Suisun Bays. Outmigrants may utilize tidal marsh areas, non-tidal freshwater marshes, and other shallow water areas in the bays as rearing areas for short periods prior to their emigration to the sea.

Additional historical and recent published steelhead abundance are summarized in NMFS west coast steelhead status review (Busby *et al.* 1996).

III. Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area (50 CFR §402.02). The action area includes a large portion of California's Central Valley. The following Central Valley streams below major water storage reservoirs are included in the action area: the Sacramento River downstream of Keswick Dam to the Sacramento-San Joaquin Delta; Clear Creek downstream of Whiskeytown Dam to its confluence with the Sacramento River; the Feather River downstream of Oroville Dam to its confluence with the Sacramento River; the Yuba River downstream of Englebright Dam to its confluence with the Feather River; Stony Creek downstream of Black Butte Reservoir to its confluence with the Sacramento River; the Bear River downstream of Camp Far West Dam to its confluence with the Feather River; the American River downstream of Nimbus Dam to its confluence with the Sacramento River; the Mokelumne River downstream of Camanche Dam to the Sacramento-San Joaquin Delta; the Calaveras River downstream of New Hogan Dam to the Sacramento-San Joaquin Delta; the Stanislaus River downstream of New Melones Dam to its confluence with the San Joaquin River; the Tuolumne

River downstream of New Don Pedro Dam to its confluence with the San Joaquin River; the Merced River downstream of New Exchequer Dam to its confluence with the San Joaquin River, the San Joaquin River downstream of Friant Dam to the Sacramento-San Joaquin Delta; and the Sacramento-San Joaquin Delta. Additional watersheds within the action area include Mill Creek, Deer Creek, Paynes Creek, Battle Creek, Butte Creek, Big Chico Creek, Thomes Creek, Cottonwood Creek, and other watersheds from the valley floor to the boundaries of national forest lands. Central Valley Project (CVP) and State Water Project (SWP) service areas outside the Central Valley are also part of the action area.

Profound alterations to the riverine habitat of the Central Valley began with the discovery of gold in the middle of the last century. Dam construction, water diversion, and hydraulic mining soon followed, launching the Central Valley into the era of water manipulation and coincident habitat degradation. A number of documents have addressed the history of human activities, present environmental conditions, and factors contributing to the decline of salmon and steelhead species in the Central Valley. For example, NMFS has prepared range-wide status reviews for west coast chinook (Myers *et al.* 1998) and steelhead (Busby *et al.* 1996). Information is also available in Federal Register notices announcing ESA listing proposals and determinations for some of these species and their critical habitat (June 16, 1993, 58 FR 33212; January 4, 1994, 50 FR 440; March 19, 1998, 63 FR 13347; September 16, 1999, 64 FR 50394; February 16, 2000, 65 FR 7764). The final Programmatic Environmental Impact Statement/Report for the CALFED Bay-Delta Program (July 2000) (CALFED 2000) and the final PEIS for the CVPIA (October 1999) (DOI 1999a) provide an excellent summary of historical and recent environmental conditions for salmon and steelhead in the Central Valley. For the purposes of this document, a general description of the environmental baseline for Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead is based on a summarization of these documents.

In general, the human activities that have affected listed Central Valley anadromous salmonids and their habitats consist of: (1) dam construction that blocks previously accessible habitat; (2) water development activities that affect the water quantity, timing, and quality; (3) land use activities such as agriculture, flood control, urban development, mining, and logging that can degrade aquatic habitat; (4) hatchery operation and practices; (5) harvest activities; and (6) ecosystem restoration actions.

1. Habitat Blockage

Hydropower, flood control, and water supply dams of the CVP, SWP, and other municipal and private entities have permanently blocked or hindered salmonid access to historical spawning and rearing grounds. Clark (1929) estimated that originally there were 6,000 miles of salmon habitat in the Central Valley system and that 80 percent of this habitat had been lost by 1928. Yoshiyama *et al.* (1996) calculated that roughly 2,000 miles of salmon habitat was actually available before dam construction and mining, and concluded that 82 percent is not accessible today. Clark (1929) did not give details about his calculation. Whether Clark's or Yoshiyama's calculation is used, only remnants of their former range remain accessible today in the Central Valley (CDFG 1998).

In general, large dams on every major tributary to the Sacramento River, San Joaquin River, and Delta block salmon and steelhead access to the upper portions of the respective watersheds. On the Sacramento River Keswick Dam blocks passage to historic spawning and rearing habitat in the upper Sacramento, McCloud and Pit rivers. On the Feather River Oroville Dam and associated facilities block passage to the upper Feather River watershed. Nimbus Dam blocks access to most the American River Basin. On the San Joaquin River, water development projects in the 19th century eliminated fall-run chinook salmon that spawned in the mainstem of the river. Friant Dam construction in mid-1940's has been associated with the elimination of spring-run chinook salmon in the San Joaquin River upstream of the Merced River (DOI 1999a).

2. Water Development Activities

The diversion and storage of natural flows by dams and diversion structures on Central Valley waterways have depleted streamflows and altered the natural cycles by which juvenile and adult salmonids base their migrations. Depleted flows have contributed to higher temperatures, lower dissolved oxygen levels, and decreased recruitment of gravel and large woody debris. In addition, the altered flow regime below several Central Valley dams has impaired the regeneration of riparian vegetation. Historical seasonal flow patterns included high flood flows in the winter and spring with declining flows throughout the summer and early fall. As flows declined during the summer, the seeds from willows and cottonwood trees, deposited on the recently created sand bars, would germinate, sprout, and grow to maturity. The roots of these plants would follow the slowly receding water table, allowing the plants to become firmly established before the next rainy season. With the completion of upstream reservoir storage projects throughout the Central Valley, the seasonal distribution of flows differs substantially from historical patterns. The magnitude and duration of peak flows during the winter and spring are reduced by water impoundment in upstream reservoirs. Instream flows during the summer and early fall months have increased over historic levels for deliveries of municipal and agricultural water supplies. Overall, water management now reduces natural variability by creating more uniform flows year-round that diminish natural channel forming, riparian vegetation, and foodweb functions.

Water diversions for irrigated agriculture, municipal and industrial use, and managed wetlands are found throughout the Central Valley. Hundreds of small and medium size water diversions exist along the Sacramento River, San Joaquin River and their tributaries. Although efforts have been made in recent years to screen some of these diversions, many remain unscreened. Depending on the size, location, and season of operation, these unscreened intakes entrain many life stages of aquatic species, including juvenile salmonids. More than 2,000 unscreened diversions in the Delta entrain resident and anadromous fishes.

3. Land Use Activities

About 150 years ago, the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation literally spreading four to five miles (Resources Agency 1989). By 1979, riparian habitat along the Sacramento River diminished to 11,000-12,000 acres or about 2 percent of historic levels (McGill 1979). More recently, about 16,000 acres of remaining

riparian vegetation has been reported (McGill 1987). The degradation and fragmentation of riparian habitat has resulted mainly from flood control and bank protection projects, together with the conversion of riparian land to agriculture (Jones and Stokes Associates 1993).

Increased sedimentation resulting from agricultural and urban practices within the Central Valley is a primary cause of salmonid habitat degradation. Sedimentation can adversely effect salmonids during all freshwater life stages by clogging, or abrading gill surfaces; adhering to eggs; inducing behavioral modifications; burying eggs or alevins; scouring and filling pools and riffles; reducing primary productivity and photosynthetic activity; and affecting intergravel permeability and dissolved oxygen levels. Embedded substrates can reduce the production of juvenile salmonids and hinder the ability of some over-wintering juveniles to hide in the gravels during high flow events.

Land use activities associated with road construction, urban development, logging, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality through alteration of streambank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of gravel and large woody debris; and removal of riparian vegetation resulting in increased streambank erosion. Agricultural practices have eliminated large trees and logs and other woody debris that would have been otherwise recruited to the stream channel. Large woody debris influences stream morphology by affecting pool formation, channel pattern and position, and channel geometry.

Historically in the Sacramento/San Joaquin Delta, tidal marshes provided a highly productive estuarine environment for juvenile anadromous salmonids. During the course of their downstream migration, juvenile winter-run chinook, spring-run chinook, and steelhead utilize the Delta's estuarine habitat for seasonal rearing, and as a migration corridor to the sea. Since the 1850s, reclamation of Delta islands for agricultural purposes caused the cumulative loss of 94 percent of the Delta's tidal marshes (Monroe *et al.* 1992).

In addition to the degradation and loss of estuarine habitat, downstream migrant juvenile salmon in the Delta have been subject to adverse conditions created by water export operations of the CVP and SWP. Specifically, juvenile salmon have been adversely affected by: (1) water diversion from the mainstem Sacramento River into the Central Delta via the manmade Delta Cross Channel; (2) upstream or reverse flows of water in the lower San Joaquin River and southern Delta waterways; and (3) entrainment at the CVP/SWP export facilities and associated problems at Clifton Court Forebay. Juvenile salmonids are exposed to increased water temperatures in the Delta during the late spring and summer due to the loss of riparian shading, and by thermal inputs from municipal, industrial, and agricultural discharges.

4. Hatchery Operation and Practices

Five hatcheries currently produce chinook salmon in the Central Valley and four of these also produce steelhead. Releasing large numbers of hatchery fish can pose a threat to wild chinook and

steelhead stocks through genetic impacts, competition for food and other resources between hatchery and wild fish, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs in the Central Valley are primarily caused by the straying of hatchery fish and the subsequent hybridization of hatchery and wild fish. In the Central Valley, practices such as trucking smolts to distant sites for release and the transferring of eggs between hatcheries contribute to elevated straying levels (DOI 1999a).

5. Harvest

Extensive ocean recreational and commercial troll fisheries for chinook salmon exist along the Central California coast, and an inland recreational fishery exists in the Central Valley for chinook salmon and steelhead. Ocean harvest of Central Valley chinook is estimated using an abundance index, called the Central Valley Index (CVI). The CVI harvest rate is the ratio of salmon harvested south of Point Arena (where 85 percent of Central Valley chinook are caught) to the CVI escapement.

Since 1970, the CVI ocean harvest index for winter-run chinook salmon has generally ranged between 0.50 and 0.80. In 1990 when additional harvest restrictions to protect winter-run chinook were first imposed by NMFS and Pacific Fisheries Management Council (PFMC), the CVI harvest rate was near the highest level at 0.79. Through the early 1990's, the ocean harvest index was below this level: 0.71 in 1991, 0.71 in 1992, 0.72 in 1993, 0.74 in 1994, 0.78 in 1995 and 0.64 in 1996. In 1996 and 1997, NMFS issued biological opinions which concluded that incidental ocean harvest of winter-run chinook represented a significant source of mortality to the endangered population, even though ocean harvest was not a key factor leading to the decline of the population (National Marine Fisheries Service 1996, 1997). As a result of these opinions, measures were developed and implemented by the PFMC, NMFS, and CDFG to reduce ocean harvest impacts by approximately 50 percent.

There are limited data on spring-run chinook ocean harvest rates. An analysis using CWT spring-run from the Feather River Hatchery estimate harvest rates were 18 percent to 22 percent for age-3 fish, 57 percent to 85 percent for age-4 fish, and 97 percent to 100 percent for age-5 fish (CDFG 1998).

Historically, in California, almost half of the river sportfishing effort was in the Sacramento-San Joaquin River system, particularly upstream from the city of Sacramento (Emmett *et al.* 1991). Since 1987, the Fish and Game Commission has adopted increasingly stringent regulations to reduce and virtually eliminate the in-river sport fishery for winter-run chinook. Present regulations include a year-round closure to salmon fishing between Keswick Dam and the Deschutes Road Bridge and a rolling closure to salmon fishing on the Sacramento River between the Deschutes Road Bridge and the Carquinez Bridge. The rolling closure spans the majority of months adult winter-run chinook salmon are ascending the Sacramento River to their spawning grounds. These closures have virtually eliminated impacts on winter-run chinook by recreational angling in freshwater.

To address potential incidental take of chinook salmon that occurs in the recreational trout fishery, the California Fish and Game Commission adopted in 1992 gear restrictions (all hooks must be barbless and a maximum 2.25 inches in length) to minimize hooking injury and mortality caused by trout anglers incidentally catching winter-run chinook. That same year, the Commission also adopted regulations which prohibited any salmon from being removed from the water to further reduce the potential for injury and mortality to winter-run chinook from the trout and steelhead fishery.

Specific regulations for the protection of spring-run chinook salmon in Mill, Deer, Big Chico, and Butte creeks were added to the existing CDFG regulations in 1994. Existing regulations, including those developed for winter-run chinook provide some level of protection for Central Valley spring-run chinook (CDFG 1998).

There is little information on steelhead harvest rates in California. Hallock *et al.* (1961) estimated that harvest rates for Sacramento River steelhead from the 1953-54 through 1958-59 seasons ranges from 25.1 percent to 45.6 percent assuming a 20 percent non return rate of tags. Staley (1976) estimated the harvest rate in the American River during the 1971-72 and 1973-74 seasons to be 27 percent. The average annual harvest rate on adult steelhead above Red Bluff Diversion Dam for the three year period 1991-92 through 1993-94 is 16 percent (McEwan and Jackson 1996).

6. Ecosystem Restoration

Preliminary, significant steps towards the largest ecological restoration project yet undertaken in the United States have occurred during the past four years and continue to proceed in California's Central Valley. The CALFED Bay-Delta Program, in coordination with other Central Valley efforts including those implemented through the CVPIA, has implemented numerous habitat restoration actions that benefit Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and their critical habitat. These restoration actions include the installation of fish screens, modification of barriers to improve fish passage, and habitat acquisition and restoration. The majority of these recent restoration actions address key factors for decline of these ESUs and emphasis has been placed in tributary drainages with high potential for winter-run chinook salmon, spring-run chinook salmon, and steelhead production. Additional actions that are currently underway that benefit Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead include new efforts to enhance fisheries monitoring and conservation actions to address artificial propagation. In the Delta, approximately 1,500 acres of land have been purchased for restoration activities since 1996. Restoration of these Delta areas primarily involves flooding lands previously used for agriculture, thereby creating additional wetland areas and rearing habitat for juvenile salmonids.

A beneficial action unrelated to the CALFED Program includes the Environmental Protection Agency's remedial actions at Iron Mountain Mine. The completion of a state-of-the-art lime neutralization plant is successfully removing significant concentrations of toxic metals in acidic

mine drainage from the Spring Creek Watershed. Containment loading into the upper Sacramento River from Iron Mountain Mine has shown measurable reductions since the early 1990's.

IV. Effects of the Action

The following section discusses the direct and indirect effects on Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, Central California Coast steelhead, and/or their designated critical habitat that are expected to result from the proposed action. Cumulative effects (effects of future State, local, or private actions on endangered and threatened species or critical habitat) are discussed separately at the end of this section.

A. General Effects

The CALFED Program is intended to increase water availability for agricultural and urban users while providing for recovery of anadromous salmonids and other species. Species recovery is to be accomplished largely through improvements to habitat, including increased water availability at key times to benefit particular species. The CALFED Program will affect species in the Sacramento River Basin, San Joaquin River Basin, Sacramento-San Joaquin Delta, and Suisun Marsh and Bay for a period of 30 years or more. Both beneficial and adverse impacts to Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Central California Coast steelhead are expected from the various component programs and strategies (see below). The huge scale and extended time frame of the CALFED Program implies that the overall effect of the CALFED Program will be determined not only by the implementation of specific actions, but by the order and location in which the actions are implemented and the successful use of adaptive management to modify actions to target a desired outcome.

B. Specific Effects

Levee System Integrity Program (LSIP)

The LSIP would reduce the risk to the ecosystem of catastrophic breaching of Delta levees by maintaining and improving the integrity of the levee system. Reduced likelihood of catastrophic breaching of Delta levees would reduce the likelihood of rapid hydrodynamic and salinity changes caused by sudden changes in Delta outflow and channel flow conditions. Although infrequently, species would benefit from the reduced frequency of sudden salinity shifts that could adversely affect habitat or delay transport to areas providing for specific species needs, such as spawning and rearing habitat. The change in flow and water quality conditions attributable to catastrophic breaching of levees also could increase entrainment in Delta diversions, depending on the change in the distribution of a species and the timing of breaches relative to the vulnerability of specific

life stages. Reduced risk of catastrophic breaching would reduce the risk of unexpected increased entrainment events.

Levee construction and maintenance actions will occur primarily under two of the five parts of the LSIP (i.e., the Delta Levee Base Level Protection Plan and Delta Levee Special Improvement Projects), plus the added plan for Suisun Marsh levees. These actions have the potential to adversely impact anadromous salmonids due to (1) noise, vibration, siltation, input of contaminants, or other impacts to aquatic habitat related to construction activities such as dredging, addition of material to achieve required cross section, installation of rip rap, or road repair; and (2) degradation or loss of shaded riverine aquatic habitat or shallow water habitat due to removal of vegetation or debris and installation, repair, or replacement of rip rap for bank protection. Disturbance and increased turbidity from in-channel construction may impair chinook salmon or steelhead feeding or cause avoidance of habitat in the immediate vicinity of the project site (Berg 1982; Feist et al. 1992; Knudsen et al. 1992). If inadequate cover remains, small fish may be more vulnerable to predation (Savino and Stein 1982). Many construction impacts and some of the other impacts to fish habitat can be avoided or minimized by using accepted construction time windows, best management practices, and habitat revegetation and restoration techniques. Plans for Delta Levee Special Improvement Projects must include explicit provisions for the protection of fish and wildlife habitat.

The inherent nature of levees used for flood control typically leads to poor-quality fish habitat that is channelized, relatively uniform with deep, fast-moving water, limited in productivity, and lacking vegetation, instream woody material, or other cover for fish (Michny and Hampton 1984; DeHaven 1999). Large, rip-rapped areas lacking riparian vegetation with shaded riverine aquatic habitat may limit the viability of the Sacramento River to support anadromous fish (Jones and Stokes 1993). Studies have shown high preference of juvenile salmonids for natural shoreline areas, indicating that continued suppression of shaded riverine aquatic habitat could hinder the successful rearing of juvenile salmonids (USFWS 1993). Continued maintenance of existing Delta levees will perpetuate poor-quality fish habitat. Therefore, major changes to levee design (i.e., in particular, using setback levees) will be required to truly improve habitat and minimize impacts to fish in leveed areas.

The ERP Plan and CALFED Stage 1 milestones call for the installation of setback levees and other measures to improve fish habitat in leveed river reaches and Delta channels and sloughs. Coordination of the LSIP with the ERP will allow for concurrent planning and implementation of significant habitat restoration along with levee improvements (see *Summary of Key Planned Actions* and *Ecosystem Restoration Program*).

The Delta Levee Emergency Management and Response Plan and Delta Levee Risk Assessment and Risk Management Strategy components of the LSIP primarily will focus on planning and funding issues related to emergency levee repairs and risks that may lead to levee failure, respectively. From NMFS' perspective, emergency levee repairs in the Delta are problematic in that they usually are required when flows are high in the winter. Juvenile anadromous salmonids are abundant in the Delta during this period, which is outside the construction time window usually

allowed by NMFS for in-channel work in the Delta. The Delta Levee Emergency Management and Response Plan will include environmental considerations in the planning process as a Stage 1 action. The risk assessment required as a Stage 1 action under the Delta Levee Risk Assessment and Risk Management Strategy may identify the levees that are most vulnerable to failure. If these levees are targeted for maintenance work during accepted construction time windows before they fail, the number of emergency levee repairs required in the Delta may decline during Phase III.

The Subsidence Control Plan is likely to only minimally affect anadromous salmonid fishes because it focuses on land use practices on the land side of Delta levees.

Water Quality Program (WQP)

The WQP is intended to improve water quality primarily through the control of contaminant sources, increased enforcement of existing regulatory programs, and provision of incentives for action that goes beyond current regulatory programs. Potential actions would address contaminants from mine drainage, urban and industrial runoff, wastewater and industrial discharge, agricultural drainage and runoff, and unknown origins (e.g., toxicity events affecting aquatic organisms that cannot be attributed to specific causes).

Reducing the quantity of contaminants (e.g., metals and toxic elements, organics and pesticides, etc.) that enter the Bay-Delta and tributaries would be expected to benefit especially resident fishes, but also anadromous salmonids. Receiving contaminants from river inflow and bi-directional tidal flow from the Bay, the Delta would benefit from WQP elements implemented upstream in the Sacramento River and San Joaquin River Regions and downstream in the Bay Region. Reduced contaminants could substantially increase system productivity which should lead to increased survival, growth, and reproduction. Fish should benefit from reduced metabolic stress and increased survival. Vulnerable salmonid life stages such as eggs and larvae especially may benefit from reductions in localized inputs of pollutants or suspended sediments. The WQP will aggressively address at least three water quality issues that are of particular importance to anadromous salmonids: (1) mercury levels in Cache Creek, (2) mercury levels in the Delta, and (3) dissolved oxygen (DO) levels in the San Joaquin River near Stockton.

Cache Creek is designated critical habitat for Central Valley steelhead, although both fish passage and elevated mercury levels present significant problems in this drainage. The WQP includes actions focused on mercury evaluation and abatement in Cache Creek. Stage 1 actions include remediation (i.e., drainage control) of mercury mines as appropriate and development and implementation of a TMDL for mercury.

Mercury is common in sediment in the Bay-Delta system (USACE et al. 1998). Methylization of mercury, which increases its potential for bioaccumulation, tends to occur when inorganic mercury is exposed to air. This is likely to happen when dredged sediment is used for levee maintenance and repair, and in habitat restoration projects such as creation of wetlands or shallow water habitat that may be used by salmonids. The WQP includes management and research elements that will focus on the methylization process in the Delta, mapping sediment mercury concentration in areas

that would be dredged during levee maintenance work, and determining the potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms. This work will be coordinated with both the ERP and the CMARP component of the SP.

The WQP will address low DO levels that occur in the Bay-Delta system, especially in the San Joaquin River near Stockton during the late summer and fall. This action is of particular pertinence to salmonid fishes, because the low DO may act as a water quality barrier to adult fall-run chinook salmon that migrate upstream to spawn in the Merced, Tuolumne, and Stanislaus Rivers between September and December. Fall-run chinook salmon is a candidate for listing under the ESA by NMFS, and is a major species targeted for recovery by CALFED. Under the WQP, CALFED will include completing studies of causes for DO depletion in San Joaquin River near Stockton, supporting finalization of Basin Plan Amendment and TMDL for constituents that cause low DO, and developing inter-substrate DO testing in conjunction with ERP.

Some actions proposed under the WQP to achieve program goals involve manipulating flow and water temperature (i.e., to influence DO), in-channel construction (e.g., installation of operable barriers in the south Delta and a screened diversion structure on the Sacramento River in the north Delta), and general flexibility in storage and operations as well as conveyance improvements to address drinking water quality problems. These actions may impact anadromous salmonids and are discussed in the *Levee System Integrity Program* and *Water Management Strategy* effects analyses.

Ecosystem Restoration Program (ERP)

The ERP is intended to achieve or contribute to the recovery of anadromous salmonids and several other species found in the Bay-Delta through the implementation of proactive restoration actions. The ERP Plan identifies over 600 programmatic actions addressing several ecosystem elements and that will be implemented throughout the Sacramento-San Joaquin River basin and Bay-Delta. These actions will be implemented in all ecological management zones. Several streams and rivers that are designated critical habitat for Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead, and are important habitat for Central Valley fall/late fall-run chinook salmon (e.g., Battle Creek, Clear Creek, Deer Creek, Cosumnes River, San Joaquin River, and Tuolumne River) specifically are targeted for large-scale restoration. ERP actions are expected to substantially improve conditions for chinook salmon and steelhead, and contribute to species recovery. Major categories of these actions and their effects on anadromous salmonids include the following:

Protection, restoration, and management of diverse habitat types. Restore tidal action to Delta sloughs; restore tidal and non-tidal wetlands; improve levee and berm management practices to protect and enhance riparian and shaded riverine aquatic habitat; protect and restore riparian vegetation; restore stream side-channel habitat where appropriate; terminate or modify programs that remove instream woody material from stream channels; improve land management and grazing practices in stream riparian zones; purchase streambank conservation easements from willing

sellers; and modify in-channel structures or features to eliminate predator habitat. These actions would improve habitat for salmonids by increasing shaded riverine aquatic habitat and Instream woody material, providing varied water depth and velocity, increasing ecosystem productivity and salmonid food supply, and reducing predatory and competitive interactions. This could lead to increased fish growth, fecundity, and survival (Miller and Simenstad 1997; DeHaven 1999).

Provide instream flows and habitat conditions in Bay-Delta tributaries sufficient for fish protection and recovery. Manage reservoirs (e.g., through establishing minimum cold-water pool size, installing temperature control devices, negotiating and implementing adequate flow release schedules, and using real-time management) and watersheds (e.g., through pumping groundwater, enhancing riparian vegetation, reducing drainage inputs of warm agricultural and urban runoff, developing and implementing watershed management plans, eliminating unpermitted diversions, and acquiring water from willing sellers) to ensure adequate streamflows and water temperatures. These actions would reduce mortality of chinook salmon and steelhead eggs and larvae, which are particularly vulnerable to elevated water temperatures and stranding; increase growth rates of rearing juvenile fish, improve juvenile and adult migration success, and decrease predatory and competitive interactions by increasing available habitat.

Improve Delta outflow during key periods. Prescribe the source, timing, and magnitude Delta outflow for key periods, and use real-time management. These actions would improve survival by promoting successful migration of juvenile and adult salmonids through the Delta, and reducing juvenile entrainment at the SWP/CVP export facilities.

Reconnect Bay-Delta tributaries with their floodplains. Maintain or restore stream meander configurations, install setback levees, develop and implement floodplain management plans, acquire flood easements, purchase floodplain lands from willing sellers, convert leveed lands to tidal wetland/slough complexes, remove levees that hinder tidal and floodflows, and conserve remaining natural floodplain topography. These actions would improve habitat for salmonids by increasing shaded riverine aquatic habitat and Instream woody material, providing varied water depth and velocity, increasing ecosystem productivity and salmonid food supply, and reducing predatory and competitive interactions. This could lead to increased fish growth, fecundity, and survival (DeHaven 1999).

Assess and limit the negative effects of hatchery propagation on natural anadromous salmonid populations. Limit hatchery stocking if populations of chinook salmon or steelhead can be sustained by natural production; adopt methods for selecting spawning adults for hatchery use from an appropriate cross section of the adult population; limit the stocking of steelhead and chinook salmon fry and smolts to natal watersheds; and select spawning adults of appropriate genetic makeup to minimize genetic contamination of existing hatchery and naturally-producing populations. These actions would help to maintain the genetic integrity of naturally spawning populations.

Restore aspects of the sediment erosion and deposition regime. Maintain, improve, or supplement gravel recruitment and natural sediment transport in streams; improve spawning gravel

and gravel availability in streams; relocate instream and floodplain gravel mining and artificially introduce gravels to compensate for sediment trapped by dams; and develop and implement appropriate land use plans that allow the natural recruitment of sediments. Spawning habitat abundance and gravel quality would improve as a result of implementing these actions. This may increase spawning success and egg and larval survival.

Eliminate fish passage barriers, and reduce fish entrainment and stranding. Remove dams to provide access to historical spawning and rearing habitat; install or upgrade fish passage facilities at dams; remove or modify culvert crossings or other barriers; install state-of-the-art, positive-barrier screens on water diversions; improve existing screens and bypass systems; eliminate or consolidate water diversions; and assess and develop recommendations to reduce stranding in floodplains, toe drains, shallow ponds, and levee borrow areas. These actions would reduce entrainment of juvenile fish and stranding of juvenile and adult fish. This would improve migration success and survival and increase adult spawning success.

Implementation of ERP actions that are intended to benefit other species may adversely affect anadromous salmonids. Such conflicts likely would be resolved through oversight by the Governance Plan or MSCS that would provide for prioritization of water needs (see *Summary of Key Planned Actions*). Preparation of ASIPs and consultation with the fish and wildlife agencies will be required prior to implementation of ERP actions.

Water Use Efficiency Program (WUEP)

The purpose of the WUEP is to increase water conservation and recycling primarily in the urban and agricultural sectors of California. Programmatic actions generally focus on expanding State and federal water recycling programs and providing planning, technical, and financial assistance to local water suppliers. This program is expected to benefit fish because water savings could reduce the demand for Delta exports, increase water available for transfers, delay the need for new water facilities, and improve water quality. Reduced demands could increase reservoir and diversion operation flexibility, and allow flow management to meet species needs or to more closely approximate the natural seasonal flow variability. Reestablishing natural seasonal flow variability (i.e., pattern and magnitude) could reactivate and maintain ecological processes and structures that sustain healthy fish, wildlife, and plant populations. Reduced contaminant delivery resulting from reduced applied water and subsequent reduced runoff would improve water quality, which could lead to improved fish health, survival, and productivity. Species also could benefit from reduced entrainment and impingement impacts due to reduced diversions, modifications in flow timing and reservoir releases, improved in-stream water quality, and increased water available for ecosystem purposes.

Water Transfer Program (WTP)

The WTP proposes a framework of actions, policies, and processes that, collectively, will facilitate water transfers and the further development of a statewide water transfer market. Therefore, this program likely will increase the occurrence of water transfers in the Sacramento-San Joaquin drainage. This would affect fisheries and aquatic resources primarily through changes to riverine flow and export. Several factors, including the source of water for a transfer and the timing, magnitude, and pathway of each transfer, influence the likelihood for potentially significant impacts. To the extent that transfers are consistent with ecosystem needs and purposes, fisheries and aquatic ecosystems would benefit. The WTP may allow water to be obtained for the EWA (see *Water Management Strategy*), which by definition will benefit fish including steelhead and chinook salmon. Benefits could include reestablishing the natural seasonal flow and salinity variability, and reduced entrainment and impingement impacts associated with reduced or rescheduled diversions. Conversely, potentially significant adverse impacts may result from transfers for agricultural and urban uses if proper planning and management of specific transfers are not undertaken. Adverse effects on species could include reduced habitat abundance attributable to flow effects, reduced transport and attraction in response to flow effects, and increased entrainment attributable to flow effects on species movement and distribution relative to the location and volume of diversions. To address these potential adverse effects, water transfers facilitated through the WTP that may affect threatened or endangered salmonids or other species will require further consultation with the appropriate fish and wildlife agencies (see *Summary of Key Planned Actions*).

Implementing the WTP will affect water operations by increasing the availability of the SWP/CVP facilities for water transfers of non-project water. Therefore, the WTP may contribute to the need for modifications to the conveyance system. These may include in-channel construction activities which could adversely impact anadromous salmonids (see *Water Management Strategy*).

Watershed Program (WP)

The WP will provide financial and technical assistance to local watershed programs that focus on achieving multiple objectives in the areas of water supply reliability, flood management, environmental restoration, and water quality. This assistance will benefit anadromous salmonids if it supports watershed level habitat restoration actions such as improving riparian habitat or fish passage, restoring wetlands, stream banks, or stream morphology, or reducing pollutant loads. Beneficial watershed-level impacts may also improve habitat conditions downstream.

Potential watershed activities that are expected to improve flows in upstream areas also would improve flows in the Delta. Ecosystem-level benefits could include a closer approximation of natural seasonal flow variability, restoration of natural sediment delivery and movement, reduced contaminant input, increased productivity, and restoration of the natural ecosystem structure, such as floodplain connectivity. Species benefits primarily would accrue from increased habitat

abundance due to improved flow conditions and increased survival, growth, and reproduction in response to improved water quality.

CALFED will promote local watershed stewardship and encourage watershed actions that include monitoring protocols and increase community learning and awareness. This should benefit fish if it encourages collection of data that may be used to make more informed fish and water management decisions, and discourages human behavior that adversely affects the watershed (e.g., destruction of fish habitat).

Flood control actions (e.g. levee construction or maintenance) implemented as part of the WP may adversely affect fish, as could construction associated with other in-channel or riparian zone actions. Impacts may occur due to disturbance of existing aquatic or riparian biological communities, mobilization of sediments, and input of contaminants. Impacts to anadromous salmonids may be avoided or minimized through the use of accepted construction time windows and best management practices (see *Levee System Integrity Program*). These activities would require further consultation with appropriate fish and wildlife agencies (see *Summary of Key Planned Actions*).

Water Management Strategy (WMS)

Storage

The ISI component of CALFED's WMS would be expected to benefit anadromous salmonids because it will contribute to increased flexibility in the timing, magnitude, and duration of reservoir releases and exports from the CVP/SWP pumps. This should provide increased opportunity for releases of water that would benefit steelhead and chinook salmon (e.g., to maintain adequate water temperature or reduce take at the export facilities). Large, long-term surface storage is suited to rapidly discharging or receiving large volumes of water, an advantage in real-time management of high river flow periods or environmental storage releases. Cold-water pool volume could increase with increased on-stream reservoir capacity. A portion of new storage may be allocated to environmental water supplies and could provide beneficial impacts through enhancement of seasonal flow needs for steelhead and chinook salmon. Species could benefit from increased productivity and improved conditions affecting movement. Total Delta outflow, however, would be reduced because total exports will increase. The diversion of water to required to fill additional storage would additionally reduce outflow. Adverse effects of reduced outflow would depend on timing and reduction in magnitude relative to base outflow conditions.

Filling in-Delta storage could adversely affect fish species, depending on the location of the storage and diversion facilities and the timing, magnitude, duration, and frequency of diversions. As discussed above, Delta outflow would be reduced. In addition, the magnitude of net reverse flow could increase in some Delta channels. Changes in Delta outflow and channel flow could affect the distribution of rearing or outmigrating chinook salmon and steelhead, potentially increasing entrainment in CVP/SWP export facilities and other Delta diversions. Depending on the location of the diversion intake, some species populations may be more affected than others. For

example, diversion from the Mokelumne channels or the San Joaquin River channel could result in potentially greater effects on Mokelumne River or San Joaquin River chinook salmon than on chinook salmon from the Sacramento River. Although the diversion into in-Delta storage would be screened, entrainment-related losses would occur, including predation, abrasion, and impingement. The operations flexibility of in-Delta storage, however, would provide the opportunity to avoid and minimize adverse effects on Delta fish species through diversions during periods when flow conditions would be minimally affected and when Delta species are least vulnerable to the effects of diversions. If diversions to in-Delta storage allow reoperation of other Delta diversions, lower diversions during periods of high fish vulnerability could benefit Delta fish species by reducing entrainment losses and potential adverse effects of Delta flows on species distribution.

For in-Delta storage, discharge directly to Delta export and diversion facilities could increase operational flexibility, potentially benefitting fish species present in the Delta by minimizing exports or diversions during periods of high fish vulnerability. Discharge for environmental benefits could, given appropriate timing, improve Delta flow conditions—reducing the magnitude of net reverse flow and increasing Delta outflow during periods of potentially high fish sensitivity. Export or diversion of in-Delta storage discharged to Delta channels, however, could result in adverse effects by increasing fish entrainment.

Simulated operations demonstrated that increased storage in and upstream of the Delta could enable average annual CVP and SWP exports to increase by 500-700 TAF (an 8-12% annual increase). The simulated increase primarily occurs during January-March and in September. Higher exports could adversely affect the population abundance of Delta species through increased entrainment-related losses, including losses of winter-, spring-, and fall-run chinook salmon. In addition, increased exports would increase the magnitude of net reverse flow conditions in Old and Middle Rivers and possibly in the lower San Joaquin River. Net reverse flow conditions are counter to natural net flow conditions in Delta channels and could reduce productivity, impair species movement, and increase entrainment in Delta diversions. Species adversely affected could include chinook salmon and steelhead. Increases of annual exports of this magnitude will require ongoing consultation with the fish and wildlife agencies.

All proposed new reservoir construction is off-stream, and consequently should not directly impede juvenile or adult salmonid migration. However, construction of storage facilities could cause short-term adverse impacts downstream due to mobilization of sediments and input of contaminants.

Implementation of the ISI will result in increased pumping of groundwater. Although the ISI also provides for actions such as groundwater monitoring and modeling, the intent is to develop the groundwater supply for agricultural, urban, and environmental uses. Under present use levels, groundwater overdrafts already occur in both Sacramento and San Joaquin Valleys during some years (CDWR 1998). Groundwater overdrafts may affect aquifer size and depth, and hence recharge to streams such as the San Joaquin River. However, the ISI will be implemented in

concert with the ERP, MSCS, EWA, and WQP and in such a way that the net effects to species and their habitats will be positive (see *Summary of Key Planned Actions and Governance Plan*).

Conveyance

South Delta

As with the ISI, the modifications to conveyance proposed under the WMS is expected to benefit anadromous salmonids because they will contribute to increased flexibility in the timing, magnitude, and duration of reservoir releases and exports from the CVP/SWP pumps. Many of the proposed modifications to conveyance in the south Delta will provide for either fully utilizing the existing export capacity or increasing the export capacity at the SWP Banks Pumping Plant (e.g., constructing a new screened intake at CCFB, implementing a SWP/CVP JPOD, changing the SWP pumping rules to increase export pumping limits, and installing a barriers at the head of Old River). Increased export capacity will benefit anadromous salmonids because it will provide for wheeling and storage that otherwise would not be available for EWA or other environmental water. However, there is some question whether adequate storage of EWA water south of the Delta (e.g., in San Luis Reservoir, Metropolitan Water District's Diamond Valley Reservoir, or groundwater storage) will be available, which may limit the benefit of increased export capacity to anadromous salmonids. Total exports are expected to increase throughout Phase III and will be facilitated by increased export capacity at the SWP pumps, potentially reducing total outflow from the Delta or contribute to increased magnitude or frequency of reverse flows. This may adversely impact anadromous salmonids unless compensated for through the EWA or other environmental water releases.

Screening the intake at CCFB to NMFS criteria ultimately should decrease the take of juvenile salmonids by reducing or eliminating entrainment at the SWP export facilities. CALFED intends to secure permits by the middle of 2003 to increase SWP pumping up to 8,500 cfs and potentially 100 TAF per month. SWP pumping is intended to be increased to the maximum capacity of 10,300 cfs by the end of Stage 1 (i.e., 2007). Prior to increasing pumping above current authorized levels, operational rules for use of additional export capability will be determined through ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements. To offset potential impacts and to provide for recovery of fishery populations, additional measures will be developed which would allow for protection of fish. These additional measures may include (a) screening, (b) new standards which limit the timing and magnitude of exports and water supply releases at key periods of fish concern, or a combination of the two. The agencies are discussing the installation of fish screen modules of 2,500 cfs each at Clifton Court Forebay. However, entrainment of fish at the pumps could increase during the interim period before the diversion is fully screened due to increased fish attraction to greater export flow. Other negative effects (e.g., increased predation, impingement, and abrasion) associated with water diversions also may increase with the greater volume of water exported. Both screening the intake and increasing water exports will require further consultation with the appropriate fish and wildlife agencies. Potential adverse impacts to fish populations will have to be monitored carefully throughout the 30-year period of Phase III.

Installation and closure of an operable barrier at the head of Old River would direct San Joaquin River flow down the main San Joaquin River channel and past Stockton. The barrier would benefit outmigrating juvenile chinook salmon and steelhead from the San Joaquin River Basin by directing their movement along the San Joaquin River pathway and away from the CVP and SWP south Delta export intakes. The likelihood of successful outmigration increases as juvenile salmonids are directed further downstream. The barrier may also benefit adult chinook salmon through improved dissolved oxygen and water temperature conditions that result from increased net flow past Stockton.

Alternatively, closure of the barrier without a concomitant reduction in exports would increase net flow toward the CVP/SWP pumps, primarily through Turner Cut, Middle River, and Old River. Net flow toward the export facilities counters the natural net flow conditions in Delta channels and could reduce productivity, impair species movement, and increase entrainment of anadromous salmonids and other species in Delta diversions. Installation and operation of this barrier will require ongoing consultation with the fish and wildlife agencies to minimize adverse effects.

Construction of barriers on other south Delta channels, such as Middle River and Old River near the CVP's Tracy fish facility, or their functional equivalent may be necessary to alleviate the reduced water levels caused by closure of the head of Old River barrier in combination with CVP and SWP export operation. The barriers would diminish tidal flow, reducing connectivity to other Delta channels and altering basic hydraulic features that affect sediment and nutrient movement, water quality conditions (for example, water temperature and dissolved oxygen), and productivity. Barriers are expected to affect water quality because circulation would be reduced for the area bounded by the barriers. Reduced circulation could change stratification patterns and flow movement that potentially affect dissolved oxygen and water temperature. Anadromous salmonids and other species could be adversely affected by loss of habitat, change in water quality conditions (including water temperature and dissolved oxygen), and impeded access to resources and conditions that allow a species to survive and reproduce. Construction and operation of the barriers likely will require ongoing consultation with the fish and wildlife agencies.

Dredging to enlarge south Delta channels, including Middle River and Old River, would increase the channel depth and further alter the natural structural features. In the short term, dredging would remove benthic communities and mobilize fine sediments. Maintenance dredging may be required over the long term, resulting in periodic short-term impacts. Dredging also may cause levee instability, which could require additional revetment and levee maintenance activities. Impacts to anadromous salmonids may be avoided or minimized through the use of accepted construction time windows and best management practices (see *Levee System Integrity Program*). These activities would require further consultation with appropriate fish and wildlife agencies. If channel enlargement is the result of setting back existing levees, salmonid habitat would potentially be increased. Installation of setback levees will be completed in coordination with the ERP (see *Summary of Key Planned Actions and Ecosystem Restoration Program*).

North Delta

The proposed North Delta Improvements are designed to address flood control, water quality, fish, and water supply reliability. Actions include modification of the Delta Cross Channel gates, channel dredging and/or setback levees in the Mokelumne River, and the creation of additional floodplain, wildlife, and fish habitat. Under the Preferred Program, north Delta improvements also include the study and evaluation of a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs. This diversion facility between the Sacramento and Mokelumne rivers would likely include a fish screen, pumps, and facilities for upstream fish passage.

Under the Preferred Program Alternative, the DCC may be closed from September through July and possibly all months, which would increase survival of juvenile salmon and steelhead entering the Delta from the Sacramento River during October-January and May 20-June 30 compared to DCC operation at the present. While the additional closure of the DCC relative to present operation is viewed as beneficial to Sacramento River origin juvenile salmon and steelhead, it may increase the frequency and magnitude of net reverse flow conditions in the lower San Joaquin River. This increase in net reverse flow could adversely affect juvenile salmon and steelhead entering the Delta through Georgian Slough and the San Joaquin river. A diversion channel on the Sacramento River could minimize this effect of DCC closures depending on the configuration of the various in delta barriers anticipated as part of the south Delta program .

Construction and operation of a screened diversion facility on the Sacramento River may be pursued during Stage 1 if the evaluations demonstrate that this facility is necessary to address drinking water quality concerns and it can be constructed without adversely affecting fish populations. The fish screens would be designed to prevent juvenile and adult fish from leaving the Sacramento River and entering the new channel with the flow diverted into the Mokelumne River. Although the fish screen facility would mitigate potential entrainment impacts, other potential adverse effects would have to be addressed prior to constructing this diversion. Existing relationships indicate that reduced flow in the Sacramento River (from flow exiting through the diversion) would cause an increase in the proportion of flow entering Georgiana Slough. Chinook salmon outmigration in the Sacramento River primarily occurs from December through May. The proportion of juveniles moving from the Sacramento River and into Georgiana Slough, therefore, is expected to increase with increased flow diverted through the Sacramento to Mokelumne River channel. Survival of chinook salmon that move into the Central Delta via the DCC and Georgiana Slough is less than survival of fish that continue down the Sacramento River toward Rio Vista. USFWS studies indicate that the survival of fish following the Sacramento River route toward Rio Vista may be several times higher than survival of fish entering the DCC and Georgiana Slough. The actual magnitude of survival, however, is uncertain and depends on other factors, including water temperature and flow or salinity. In addition, abrasion, increased predation, impingement on fish screens or other diversion structures, stress from being handled, and movement to inappropriate habitat would reduce the survival of fish contacting the fish screens.

Potential impacts to adult chinook salmon and steelhead could arise from a new channel which would direct additional Sacramento River water into the Mokelumne River channels and the central Delta. In combination with reduced flow down the Sacramento River channel, chinook salmon and steelhead adults migrating upstream to spawn may be attracted to the Mokelumne River channels and subsequently to the Sacramento River. The fish screen at the diversion facility on the Sacramento River would prevent movement of adult fish into the Sacramento River. Although fish ladders or other passage facilities may be constructed, the efficiency of moving fish to the Sacramento River will depend on many factors, some level of migration delay and blockage is likely. Adverse impacts may include mortality, reduced fecundity or reproductive success, and straying, potentially affecting the fitness of natural spawning and rearing populations in appropriated habitats. The addition of Sacramento River flow to the Mokelumne River channels could also confuse adult chinook salmon returning to spawn and delay outmigration of juveniles to the ocean. The flow reduction in the Sacramento River downstream of the diversion may reduce smolt survival, because there is a strong, positive flow-abundance relationship for juvenile chinook salmon in this reach of the Sacramento River (Brandes and McClain, in press).

The diversion of additional Sacramento River water into the Mokelumne River channels and the central Delta would increase the frequency and magnitude of natural channel net flow direction in the Lower San Joaquin River, but reduce the magnitude of natural net channel flow in the Sacramento River below the diversion, primarily during February to June. Natural net flow conditions in the Lower San Joaquin River channel could increase productivity, enhance species movement, and reduce entrainment in Delta diversions. The effects of reduced flow in the Sacramento River below the diversion could adversely affect habitat

Dredging to enlarge the Mokelumne River would increase the channel depth and further alter the natural structural features. In the short term, dredging would remove benthic communities and mobilize fine sediments. Maintenance dredging may be required over the long term, resulting in periodic short-term impacts. Dredging also may cause levee instability, which could require additional revetment and levee maintenance activities. Impacts to anadromous salmonids may be avoided or minimized through the use of accepted construction time windows and best management practices (see *Levee System Integrity Program*). These activities would require further consultation with appropriate fish and wildlife agencies. If channel enlargement is the result of setting back existing levees, salmonid habitat would potentially be increased. Installation of setback levees will be completed in coordination with the ERP (see *Summary of Key Planned Actions* and *Ecosystem Restoration Program*).

Environmental Water Account (EWA)

The EWA is part of CALFED's Water Management Strategy, designed to improve fisheries protection while providing improvements in water quality and waters supply reliability. The purpose of the EWA is to provide water for fisheries protection and recovery beyond that available through existing regulatory actions. The EWA will be managed by NMFS, FWS, and

DFG to address the real-time needs of the fisheries resources in the Central Valley, with an emphasis in the delta.

The EWA is currently designed to be implemented for four years and contains initial assets totaling 380,000 acre-feet of water available annually. During Stage 1, the EWA can be used to augment instream flows, augment delta outflows, improve delta hydrodynamics, and curtail CVP/SWP exports during key periods of fishery concern. The EWA is based upon the concept that flexible management of water will achieve fishery and ecosystem benefits more efficiently and to a greater degree than a completely prescriptive regulatory approach. Development and use of the EWA will require coordination with the other components of the WMS (i.e., conveyance and storage).

The ability of the EWA to provide for additional fisheries protection over pre-CALFED baseline conditions will depend to a large degree on its implementation. It is anticipated that EWA water will be available to reduce Delta exports during key rearing and outmigration periods for juvenile chinook salmon and steelhead. Additional EWA benefits to anadromous salmonids may include improved flow and temperature conditions for spawning, rearing, and migration in upstream areas. However, management of the EWA must also address potential adverse effects. Changes in reservoir release patterns may adversely affect anadromous salmonids by reducing reservoir carryover storage levels and increasing downstream water temperatures. Fluctuations in reservoir releases may dewater redds or strand juvenile fish. As the EWA managers, NMFS, FWS, and DFG must fully consider potential upstream effects during the implementation of EWA actions.

Implementation of the EWA is anticipated to significantly benefit anadromous salmonids, particularly rearing and outmigrating juveniles in the delta. A number of computer simulations conducted during the CALFED planning effort demonstrated benefits to juvenile anadromous salmonids can be realized in virtually all water years. In general, benefits to anadromous salmonids in the delta can be achieved by reducing water exports at times when fish are most vulnerable to pumping and exports can be increased when fish are less vulnerable.

If the EWA is not fully implemented, project operations will return to baseline operations as defined prior to CALFED: (the WQCP, 1993 winter-run chinook salmon biological opinion, 1995 biological opinion on OCAP for delta smelt and splittail, and CVPIA implementation including the 800,000 acre-feet supply of water pursuant to Section 3406(b)(2) in accordance with Interior's October 5, 1999 decision as clarified previously in the document). In addition, the following clarifications are set forth: 1) CVP/SWP will implement both the flow and export provisions of either VAMP or, in the absence of VAMP, the flows and export curtailments in the 1995 biological opinion on OCAP; 2) if or when the yellow light level in the incidental take statement is reached, as identified in the 1995 OCAP biological opinion, the CVP/SWP will immediately reinstate consultation and implement actions to reduce the amount or extent of take and reduce the indirect effects of project operations on fish as deemed necessary by the fishery resource agencies; 3) all new projects which may affect the environmental baseline identified in this opinion and the 1995 OCAP opinion will be subject to section 7 consultation to avoid and/or minimize the effects of those actions; and 4) other necessary regulatory provisions which may be required to meet the needs of listed species (e.g. spring run chinook salmon and steelhead).

Science Program

Implementing the Science Program may adversely affect anadromous salmonids through take of fish during monitoring and research efforts. However, overall beneficial effects are expected because the Science Program will obtain, analyze, and interpret modeling results and data that will be used to guide implementation of the different CALFED programs and strategies. The success of programs and actions continually will be evaluated, and the Science Program will provide recommendations for adaptive management that is to promote species restoration. CALFED will use the Science Program to measure progress towards meeting prescriptions for MSCS evaluated species primarily by monitoring the distribution and abundance of habitat types over time. Many of the programs and actions proposed by CALFED have not been implemented previously on a large scale (e.g., installation of setback levees) or a statewide scale (e.g., the WUEP). The beneficial effects of implementing other more common actions, such as restoration of wetlands or shaded riverine aquatic habitat, are not well understood. Information obtained through the Science Program will lead to better understanding and greater ability to predict the effects of implementing particular actions on salmonids and other species.

Science program monitoring and research activities that should provide information used to promote restoration of anadromous salmonids include studies of food web and fish population dynamics in the Delta, real-time monitoring for enhanced fish protections and flexible operations for water suppliers, and water quality monitoring in the San Joaquin River. Many of the actions proposed under the ERP, WQP, and other CALFED programs involve monitoring and research components. These components will be implemented in coordination with the Science Program. Additionally, the Science Program likely will inherit several ongoing monitoring and research studies from the IEP. These studies may form the basis for long-term data sets that contain both pre- and post-CALFED data, which may prove critical for evaluating the overall success of CALFED.

Monitoring and research of juvenile salmonids in the Bay-Delta system likely will involve their collection during periodic fish sampling. Collection methods may include electroshocking in shallow, freshwater areas. Outmigrant trapping or trawling are commonly used in deeper or more saline locations. These collection methods all may lead to mortality of fish, although the greatest mortality likely would occur from trawling due to abrasion of fish while the trawl is in motion. Electroshocking and outmigrant trapping equipment and techniques have been improved in recent years to reduce fish mortality, but still would physically and physiologically stress fish. Delayed mortality or permanent injury may be incurred. Fright responses or minor injuries resulting from collection or handling may temporarily impair feeding or increase vulnerability to predation or injury once fish are released.

Sampling mortality of juvenile salmonids is expected to be acceptably low if normal precautions against it are taken. Electroshocking equipment may be adjusted to reduce mortality or injury. Stress or injury resulting from handling may be reduced if juvenile salmonids are anesthetized prior to handling, and allowed to recover from the effects of the anesthetic prior to release

(Summerfelt and Smith 1990). Juvenile salmonids, if anesthetized and held in cool water, tend to be robust compared to larval salmonids or other species such as delta smelt. Monitoring and research that is to occur through the Science Program likely will be conducted by experienced crews using established sampling protocols that have explicit take limits established through consultation with the fish and wildlife agencies.

Data collected from adult steelhead and chinook salmon likely will be collected in upstream areas by observation only (e.g., by snorkeling, at fish passage facilities, or during redd counts). Snorkel observations may be the preferred method of data collection for juvenile salmonids in upstream areas as well. Because these methods do not involve physically handling the fish, their effects likely would be limited to minor, temporary fright responses. Carcass surveys may similarly disturb remaining live adult steelhead or chinook salmon that are preparing to spawn.

Multi-Species Conservation Strategy (MSCS)

The MSCS encompasses all CALFED program elements and strategies and is the guiding document for species conservation throughout Phase III. Its implementation is expected to greatly benefit anadromous salmonids. In the MSCS, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley fall/late fall-run chinook salmon, and Central Valley steelhead have been assigned the conservation goal of recovery (“R”). With respect to anadromous salmonids within the MSCS focus area, recovery is equivalent, at a minimum, to completing the actions within the ERP Ecological Management Zones that are required for delisting a species under the federal and state ESAs. Central California Coast steelhead is expected to be minimally affected by CALFED, and therefore has been assigned a conservation goal of maintain (“m”). The MSCS also describes how goals will be achieved through species prescriptions, which are targets that describe the future expected changes in evaluated species’ habitats and populations with full implementation of CALFED. If evaluated species prescriptions are achieved, CALFED goals for evaluated species will have been met. CALFED is expected to undertake all of the actions within the ERP Ecological Management Zones necessary to recover Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley fall/late fall-run chinook salmon, and Central Valley steelhead, and is expected to avoid, minimize, and compensate for the adverse effects of its actions on Central California Coast steelhead.

The MSCS contains two types of conservation measures: (1) measures to avoid, minimize, and compensate for the adverse effects to evaluated species caused by individual CALFED actions, and (2) measures to enhance evaluated species that are not directly linked to CALFED’s adverse effects, are consistent with the ERP, and may be milestones. Both types of measures will be implemented through the use of ASIPs that will be developed for specific CALFED actions or bundles of actions. The MSCS also allows for additional, project-specific conservation measures to be included in ASIPs.

The MSCS could adversely impact anadromous salmonids if their habitat requirements conflict with the conservation measures recommended for other species (e.g., releases of water at

inappropriate times or of inadequate temperature). Implementation of such measures could reduce the feeding, growth, spawning success, or survival of steelhead or chinook salmon. These types of adverse impacts likely will be avoided because the conservation measures will be included in ASIPs which will require consultation with the fish and wildlife agencies. CALFED will use the Science Program to ensure proper implementation of the MSCS.

Governance Plan

The CALFED Program is to be implemented in stages over a period of 30 years. Project descriptions and funding sources have been most clearly identified for actions that are to occur during Stage 1 (i.e., the first 7 years of Phase III). However, the CALFED Governance Program provides a framework that includes the following provisions for oversight of both short- and long-term implementation:

- # Grouping of actions to ensure beneficial impacts (i.e., resulting primarily from ERP actions) are concurrent in time and location with adverse impacts. Actions are intended to take place in an integrated framework and not independently of the other programs. The Governance Program is to establish reliable short-term and long-term funding for each program element and for each bundle of Stage 1 actions;
- # Using ASIPs to ensure adequate, site-specific and tiered consultations with the resource agencies prior to the implementation of specific actions. The ASIPs will serve as the biological assessments for these actions, and NMFS will use the ASIPs to develop action-specific biological opinions that include incidental take statements. Compliance with the terms and conditions of existing biological opinions, and thus consistency with previous NMFS consultations, will be assured in the action-specific biological opinions.
- # Using the Science Program to direct research and monitor impacts to species populations. Research and monitoring related to Stage 1 actions will be used to develop adaptive management strategies and direct implementation of later actions. CALFED objectives will remain fixed over time, but the actions may be adjusted to assure that the solution is durable. Adaptations are expected to be necessary as conditions change and as more is learned about the system and how it responds;
- # Using species-specific, Stage 1 milestones to ensure that beneficial impacts of the CALFED Program are significant, broad, and occur at an acceptable pace. These milestones have been developed from the ERP/WQP targets and programmatic actions, and MSCS conservation measures. The milestones also include Science Program actions that are relevant for ERP, WQP, and MSCS implementation. Progress toward attaining all milestones will be continually reviewed by the resource agencies. Milestones may be revised to provide for the protection of species through adaptive management; and

- # Using key planned actions for additional guidance in CALFED Program implementation.

Use of the above mechanisms to provide oversight would be expected to lead to an overall beneficial impact of implementation of the CALFED Program to chinook salmon and steelhead.

C. Overall Effects

The CALFED Program is intended to increase water availability for agricultural and urban users over a period of 30 years while providing for recovery of anadromous salmonids and other species. Groundwater pumping, reservoir storage, and water exports for agricultural and urban use all are expected to increase. Although these actions could have substantial adverse effects on Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Central California Coast steelhead, more water is expected to be made available to benefit species at key times. Specifically, the increased development of water sources, combined with increased efficiency in water use under the WUEP, water transfers under the WTP, and in conveyance will allow assets to accrue in the EWA component of the WMS. The CALFED Program assures that additional environmental water will be available as needed under Tier 3 of the WMS, even during periods of drought. Lack of adequate Tier 3 water will trigger reinitiation of consultation with the fish and wildlife agencies at the programmatic level.

The ERP and WQP should provide overall beneficial impacts to anadromous salmonids by greatly improving fish habitat and water quality, respectively. Generally, negative impacts of in-channel construction actions implemented under the LSIP, ERP, WP, Storage, and Conveyance elements can be avoided and minimized using best management practices and appropriate time windows for construction, and coordination with the ERP. Projects involving levee construction and maintenance in particular will be coordinated with the ERP to not only minimize adverse impacts, but to restore fish habitat through installing setback levees where possible. The SWP/CVP export facilities, which constitute a major source of mortality for outmigrating juvenile salmonids, are to be screened.

Oversight of the CALFED Program is critical to assure that adverse impacts to anadromous are avoided and minimized, and that habitat restoration and species recovery occur as planned. This oversight will involve the active participation of the fish and wildlife agencies, and will be achieved through use of the Governance Program, ERP, Science Program, and MSCS. ASIPs will be used to evaluate the impacts of specific actions. Progress toward achieving ERP/WQP targets and programmatic actions, MSCS conservation measures, and Stage 1 milestones will continually be evaluated. Adaptive management will be used as needed.

V. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

Non-Federal actions which may affect listed species within the action area considered in this biological opinion include changes in State angling regulations, State hatchery practices, voluntary State or private sponsored habitat restoration activities, changes in agricultural practices or the demand for agricultural products, and increased population growth and urbanization.

State angling regulations are generally moving towards greater restrictions to protect listed fish species. Through seasonal and area closures, greater numbers of adult listed fish are expected to complete their migration to upstream spawning areas. Mass marking of juvenile anadromous fish produced at Central Valley hatcheries could allow for the implementation of selective ocean and in-river harvest. A selective fishery that targets only externally marked hatchery production and that releases unmarked naturally spawned fish may significantly reduce harvest rates on listed salmonids. In general, these changes in State angling regulations are expected to increase populations of listed salmonids.

State hatchery practices could reduce natural stocks of listed salmonids and their overall populations through competition, reduction in genetic diversity, and disease transmission resulting from hatchery introductions. However, whether hatchery practices adversely affect listed salmonids may also depend on other factors such as predation and habitat quantity and quality. Efforts are currently underway between NMFS and the State to modify existing hatchery practices in ways to augment salmon and steelhead populations without having detrimental effects on naturally spawning populations. Through the close evaluation of practices at all Central Valley salmon and steelhead hatcheries, the State is expected to determine the effects on wild populations and take steps to change these practices if needed.

State and/or privately sponsored habitat restoration activities may have short-term negative effects associated with in-water construction. The effects of such actions are expected to be temporary and localized. The overall outcome is expected to benefit listed salmonids. An exception is the potential increase in non-native species to levels detrimental to native species, including listed salmonids, as an outcome of the reestablishment of aquatic areas in the action area. Mitigation strategies for such activities are identified in the CALFED Bay-Delta Program.

Changes in agricultural practices or the demand for agricultural produces could adversely effect listed salmonids if they result in agricultural interests being less willing to sell water for fish and wildlife purposes. Changes in demand could change the ratio of permanent to annual crops such that water availability on an annual basis for certain CALFED Programs (e.g. the Environmental Water Account) is affected. This is particularly of concern if the opportunities to acquire water for

fish and wildlife purposes is decreased. CALFED Program efforts through the Water Use Efficiency and Conservation Program and Storage may minimize or mitigate these potential effects.

Increased population growth and urbanization in the action area may negatively impact water quality, riparian function, and stream productivity, adversely affecting listed salmonids. Population growth creates a demand for land for residential, commercial and infrastructure use. Current estimates anticipate that California's population will triple between the year 2000 and the year 2040. Not only is this expected to put tremendous pressure on agricultural land and public services but it will challenge CALFED's ability to provide quality aquatic habitat for listed salmonid species. CALFED program efforts through the Ecosystem Restoration Program (with its primary objective of long-term ecological benefits), and the Water Quality, Watershed, and Storage Programs, may minimize or mitigate these potential effects.

VI. Conclusion

The Federal CALFED Co-Lead Agencies and the State of California have made commitments to uphold the ESA during implementation (Phase III) of the CALFED Bay-Delta Program by review of individual actions and initiation of Section 7 consultations on actions that may affect listed species under the jurisdiction of NMFS. By doing so along with implementing the program as described, including the key planned actions described previously in this biological opinion, combined with the current status of Sacramento River Winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Central California Coast steelhead, the environmental baseline for the action area, the anticipated direct, indirect, and cumulative effects of the proposed action, it is NMFS' biological opinion that implementation of the CALFED Bay-Delta Program's Preferred Program Alternative is not likely to jeopardize the continued existence of Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, or Central California Coast steelhead. NMFS has also determined that the action, as proposed, is not likely to destroy or adversely modify critical habitat for these species.

This no-jeopardy determination, at the programmatic scale, is not intended to, nor does it preclude NMFS from making future jeopardy determinations based on the effects analysis for action specific implementation programs.

Due to the programmatic nature of this biological opinion, the project- and action-specific information necessary to determine the amount and extent of incidental take of Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead and/or Central California Coast steelhead associated with individual CALFED Bay-Delta Program activities/actions is lacking. Therefore, incidental take of these listed anadromous salmonids is not authorized in this programmatic biological opinion. Thus, the Federal CALFED CO-Lead Agencies will initiate individual Section 7 consultations with NMFS for action-specific implementation programs which may affect these listed anadromous salmonids. Future biological opinions that are tiered under this programmatic opinion will estimate, evaluate, and authorize the

amount and extent of incidental take associated with action specific plans that cannot be avoided or mitigated and will not preclude survival and recovery of the listed species.

VIII. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or to develop information. NMFS recommends that the CALFED Bay-Delta Program, through the Federal co-lead agencies:

1. Provide annual accomplishment reports to NMFS regarding implementation of CALFED Bay-Delta programs, activities, and actions.
2. In addition to the goals of ERP, incorporate the viable salmonid population (VSP)² concept (NMFS 1999) into the anadromous salmonid goals of the CALFED Bay-Delta Program.
3. Actions to restore and create waterfowl habitat along Central Valley waterways should be designed in a manner to avoid the creation of predatory fish holding habitat and prevent the entrapment of juvenile and adult salmonids.
4. CALFED action agencies should coordinate closely with non-federal action agencies on activities affecting listed species within the action area to assure avoidance and minimization of potential cumulative adverse effects.

IX. Reinitiation Notice

This concludes the programmatic consultation on the implementation of the Preferred Program Alternative for the CALFED Bay-Delta Program as described in the July 2000 Final EIS/EIR. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the actions has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of agency actions that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. This programmatic biological opinion does not provide incidental take authorization. However, it is expected that the Federal co-leads for the CALFED Bay-Delta Program will initiate individual Section 7 consultations with NMFS for actions/activities which may affect listed anadromous salmonids.

²A *viable salmonid population* (VSP) is an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation (random or directional), local environment variation, and genetic diversity changes (random or directional) over a 100-year time frame.

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APPENDIX A

CALFED BAY-DELTA PROGRAM

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS
(Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

CALFED BAY-DELTA PROGRAM

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS (Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation)

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) set forth new mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and federal action agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate “essential fish habitat” (EFH) in fishery management plans (FMPs) or FMP amendments for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to NMFS’ conservation recommendations. In addition, NMFS is required to comment on any state agency activities that would impact EFH. Although the concept of EFH is similar to that of “Critical Habitat” under the Endangered Species Act, measures recommended to protect EFH are advisory, not proscriptive.

The Pacific Fisheries Management Council has delineated EFH for west coast groundfish (PFMC 1998a) and coastal pelagic species (PFMC 1998b) and is currently delineating EFH for Pacific Coast Salmon through amendment 14 to the Pacific Coast Salmon FMP (PFMC 1999). Species within the action area of the preceding biological opinion which require EFH consultation are Chinook Salmon (*Oncorhynchus tshawytscha*), Northern anchovy (*Engraulis mordax*), and Starry flounder (*Platichthys stellatus*).

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

Essential fish habitat (EFH) is defined in the MSFCMA as “...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity...”. NMFS regulations further define “waters” to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; “substrate” to include sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” to mean the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” to cover a species’ full life cycle.

The geographic extent of EFH for coastal pelagic species and west coast groundfish includes waters, substrates and biological communities within bays and estuaries of the Pacific coast seaward from the high tide line (MHHW) or extent of upriver saltwater intrusion. This includes waters of Suisun Bay and Marsh which are within the action area of the preceding biological opinion.

For Pacific coast salmon, the geographic extent of EFH currently being considered includes both marine and freshwater habitat. For purposes of this consultation, Pacific coast salmon EFH corresponds to “Critical Habitat” designated under the Endangered Species Act for Sacramento River winter-run chinook (58 FR 33212), Central Valley Spring-run chinook salmon, and Central Valley Steelhead (65 FR 7764).

LIFE HISTORY AND HABITAT REQUIREMENTS

Northern Anchovy and Starry Flounder

Northern anchovy are small, short-lived fish typically found in schools near the surface. They rarely exceed four years of age and 18 cm total length. They eat phytoplankton and zooplankton by either filter feeding or biting, depending on the size of the food. Sexual maturity occurs at age two. Spawning occurs during every month of the year, increasing in late winter and early spring, peaking from February to April. Preferred spawning temperature is 14°C and eggs are most abundant at temperatures of 12°C to 16°C. Females spawning batches of eggs throughout the spawning season at intervals as short as seven to ten days. Both eggs and larvae are typically found near the surface.

Starry flounder are an important member of the inner continental shelf and shallow sublittoral communities. Most spawning occurs in estuaries or sheltered inshore bays, in less than 45 m of water. Eggs and larvae are epipelagic; juveniles and adults are demersal. Eggs occur at or near the surface over water 20-70 m deep. Larvae are found in estuaries to 37 km offshore. Juveniles are found in estuaries and the lower reaches of major coastal rivers. Adults also occur in estuaries or their freshwater sources year-round. Juveniles prefer sandy to muddy substrates, and adults prefer sandy to coarse substrates. Eggs are found in polyhaline to euhaline waters; juveniles are found in mesohaline to fresh water; adults and larvae are found in euhaline to fresh water. Starry flounder are not considered to be a migratory species, however, adults move inshore in late winter-early spring to spawn and offshore and deeper in the summer and fall, but these coastal movements are generally less than 5 km. Adults and juveniles are known to swim great distances up major coastal rivers (>120 km) but not following any migratory trend. In California, starry flounder spawn from November-February, peaking in December. Larvae are planktivorous. Juveniles and adults are carnivorous. Large fish fed on a wider variety of items, including crabs and other more mobile foods. In other areas, clams and benthic fishes are an important part of the starry flounder's diet.

Chinook Salmon

General life history information for chinook salmon is summarized in the preceding biological opinion. Further detailed information on chinook salmon ESUs are available in the NMFS status review of chinook salmon from Washington, Idaho, Oregon, and California (Myers et al., 1998), and the NMFS proposed rule for listing several ESUs of chinook salmon (NMFS, 1998).

Population trends for Sacramento River winter-run and Central Valley Spring-run chinook salmon are also presented in the preceding biological opinion. Trends in abundance of fall- and late fall-run chinook within the Sacramento and San Joaquin River Basins and Delta are mixed, but the number of natural spawners has been quite high (5-year geometric mean was 190,000 natural spawners for the Sacramento River Basin). Populations in the San Joaquin Basin have experienced booms and busts but currently appear to be on an upward trend in abundance.

II. PROPOSED ACTION.

The proposed action is described in Part I of the preceding biological opinion for the endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, and threatened Central Valley Steelhead.

III. EFFECTS OF THE PROJECT ACTION

The following is a general description of the non-fishing related activities that directly or cumulatively, temporarily or permanently may threaten the physical, chemical and biological properties of the habitat utilized by west coast groundfish species (starry flounder), coastal pelagic species (northern anchovy) or Pacific coast salmon and their prey within the proposed project area. The direct result of these threats is that the function of EFH may be eliminated, diminished or disrupted.

Potential impacts to Pacific coast salmon EFH, specifically Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead, due to the proposed action have been described in the preceding biological opinion. These potential impacts would also apply to Central Valley fall and late-fall run chinook salmon.

Adverse effects of the proposed action on west coast groundfish (starry flounder) EFH and coastal pelagic species (northern anchovy) EFH may occur through water diversions, aquatic habitat restoration or enhancement activities, and changes in agricultural practices. Various life stages of coastal pelagic species or west coast groundfish may be effected by water diversions through entrapment or impingement on intake screens. Aquatic habitat restoration or enhancement activities may result in the loss of habitat upon which various life stages of coastal pelagic species or groundfish rely. Changes in agricultural practices may cause changes in water quality through the introduction of fertilizers, herbicides, insecticides, animal wastes, and other chemicals to the extent that EFH for coastal pelagic species and/or groundfish is affected.

IV. CONCLUSION

Upon review of the anticipated effects of the CALFED Bay-Delta Preferred Program Alternative (the proposed action), including the Multi-Species Conservation Strategy (MSCS), NMFS believes that on a programmatic level the proposed action is not likely to adversely effect Pacific coast

salmon EFH. However, while the proposed project action includes efforts to increased aquatic habitat quality overall the potential still exists to imposes limited adverse affects on EFH for coastal pelagic species or west coast groundfish.

V. EFH CONSERVATION RECOMMENDATIONS

Pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Act, NMFS recommends that the conservation recommendations included in the preceding programmatic biological opinion be adopted as EFH Conservation Recommendations for Pacific coast salmon. NMFS also recommends, as an additional EFH Conservation Recommendation, that action specific EFH consultations be completed for CALFED Program actions prior to their implementation in order to assess the effects on coastal pelagic species, west coast groundfish, and/or Pacific coast salmon EFH, as appropriate.

VI. CALFED FEDERAL CO-LEAD AGENCY STATUTORY REQUIREMENTS

The Magnuson-Stevens Act (Section 305(b)(4)(B)) and Federal regulations (50 CFR Section 600.920(j)) to implement the EFH provisions of the MSFCMA require federal action agencies to provide a written response to EFH Conservation Recommendations within 30 days of its receipt. Federal action agencies included in this consultation are the CALFED Federal Co-Lead Agencies (Bureau of Reclamation, Fish and Wildlife Service, Army Corps of Engineers, Environmental Protection Agency, National Marine Fisheries Service, and Natural Resources Conservation Service). The appropriate federal agency implementing the CALFED action is responsible for responding to EFH Conservation Recommendations. A preliminary response is acceptable if final action cannot be completed within 30 days. The final response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on delineated EFH. If the response is inconsistent with our EFH Conservation Recommendations, it must provide an explanation of the reasons for not implementing them. Because the EFH designation for Pacific coast salmon has yet to be approved, this regulation does not apply to this EFH until approved by the Secretary of Commerce at which time the 30 day period will commence.

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APPENDIX B

CALFED BAY-DELTA PROGRAM

ENVIRONMENTAL WATER ACCOUNT OPERATING PRINCIPLES AGREEMENT

INSERT FINAL EWA OPERATING PRINCIPLES AGREEMENT

APPENDIX C

CALFED BAY-DELTA PROGRAM

CALFED Ecosystem Restoration Program Stage 1 Milestones (Final August 25, 2000)

Table C-1. CALFED Ecosystem Restoration Program Stage 1 Milestones (Final August 25, 2000)

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Delta and East Side Tributaries		
<u>Ecological Processes</u>		
Develop a methodology for evaluating delta flow and hydrodynamic patterns and begin implementation of an ecologically based plan to restore conditions in the rivers and sloughs of the Delta sufficient to support targets for the restoration of aquatic resources.	Bay-Delta Hydrodynamics	Central Valley chinook salmon and steelhead, green sturgeon, delta smelt, longfin smelt, and Sacramento splittail
Develop and implement temperature management programs within major tributaries in the Eastside Delta Tributaries EMZ. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.	Central Valley Stream Temperatures	Central Valley fall/late fall-run chinook salmon and steelhead
Provide a fall or early winter outflow that emulates the first "winter" rain through the Delta.	Central Valley Streamflow	all Central Valley salmonids
Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within the Eastside Delta Tributaries EMZ.	Coarse Sediment Supply	all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Norther California black walnut

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within the Eastside Delta Tributary EMZ.	Natural Floodplain and Flood Processes	all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut
<u>Habitats</u>		
In the Sacramento-San Joaquin Delta EMZ, cooperatively enhance at least 15% of the ERP target for wildlife friendly agricultural practices.	Agricultural Lands	greater sandhill crane, giant garter snake, Swainson’s hawk
Restore a minimum of 15 miles of slough habitat (widths less than 50 to 75 feet) in each of the North, East, South, Central and West Delta EMUs that allows for the colonization of delta mudwort and delta tule pea.	Delta Sloughs	all Central Valley salmonids, delta smelt, Sacramento splittail, Sacramento perch, giant garter snake, delta mudwort, delta tule pea
Restore a minimum of 500, 250, 1,000, and 2,500 acres of nontidal emergent wetland in the North, East, South, and Central and West Delta Ecological Management units respectively. Establish at least one population of bristly sedge in each EMU.	Fresh Emergent Wetland (nontidal)	giant garter snake, California black rail, bristly sedge
Restore a minimum of 500, 500, 4,000, and 5,000 acres of tidal emergent wetland in the North, East, South, and Central and West Delta Ecological Management units respectively.	Fresh Emergent Wetland (tidal)	all Central Valley salmonids, green sturgeon, longfin smelt, delta smelt, Sacramento splittail, California black rail, Mason’s lilaeopsis, delta mudwort, delta tule pea
Conduct surveys to locate potential habitat restoration sites capable of supporting Antioch dunes evening primrose, Contra Costa wallflower, and Lange’s metalmark butterfly. Enhance 50 acres of low to moderate quality Antioch inland dune scrub habitat to support these species. Annually monitor establishment success.	Inland Dune Scrub	Lange’s metalmark butterfly, Antioch dunes evening primrose, Contra Costa wallflower

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Restore a minimum of 125 acres of channel islands and 125 acres of shoals in the Delta.	Midchannel Islands and Shoals	all Central Valley salmonids, Sacramento splittail, delta smelt, black rail
Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat, and instream cover along at least one tributary within the Eastside Delta Tributary EMZ	Riparian and Riverine Aquatic Habitats	Central Valley steelhead, fall/late fall-run chinook salmon, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher, delta coyote thistle
Implement 25 percent of the ERP target for diverse, self-sustaining riparian community for each EMU in the Sacramento-San Joaquin Delta EMZ.	Riparian and Riverine Aquatic Habitats	Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, little willow flycatcher, California yellow warbler
Restore a minimum of 300 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River, Cosumnes River, and Calaveras River and protect existing riparian habitat.	Riparian and Riverine Aquatic Habitats	Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, little willow flycatcher, California yellow warbler, Valley elderberry long-horn beetle
Enhance, protect and restore 1,000 to 1,500 acres of seasonal wetlands in the East Delta EMU for optimum greater sandhill crane habitat.	Seasonal Wetlands	greater sandhill crane, Swainson’s hawk
Restore a minimum of 500, 250, 500, and 750 acres of tidal perennial aquatic habitat in the North, East, South, and Cental and West Delta Ecological Management units respectively.	Tidal Perennial Aquatic Habitat	all Central Valley salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon
<u>Stressors Reduction</u>		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within Eastside Delta tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon, green sturgeon, Sacramento splittail
Provide unimpeded upstream and downstream passage for salmon and steelhead on Eastside Delta tributaries.	Dams and Other Structures	all Central Valley salmonids
Assist in the development and implementation of a black and clapper rail impact reduction program.	Disturbance	California black rail, California clapper rail
Develop and begin implementation of a program to reduce or eliminate the influx of non-native aquatic species in ship ballast water.	Invasive Aquatic Organisms	all covered fish species
Complete installation of fish passage facilities at Bellota Weir, Clements Dam, and Cherryland Dam on the Calaveras River and provide passage flows.	Dams and Other Structures	Central Valley fall/late fall-run chinook salmon and steelhead
Develop and begin implementation of a demonstration program to reduce invasive non-native plant abundance within at least one EMU in the Delta.	Invasive Aquatic Plants	Susiun Marsh aster, Mason’s lilaepsis, delta mudwort, delta tule pea
Implement a program to improve fish passage and reduce predation on juvenile salmonids below Woodbridge Dam on the lower Mokelumne River that includes the following elements: (1) improving the form and function of the stream channel; (2) rebuilding the Woodbridge Dam fish passage and diversion screening facilities to minimize losses of downstream migrating salmon and steelhead; and (3) improving the fish bypass discharge.	Predation and Competition	Central Valley fall/late fall-run chinook salmon, steelhead
Consolidate and screen 50 small agricultural diversions in the Delta, prioritized according to size, location, and season of operation.	Water Diversions	all R and r covered fish

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Upgrade screens at Southern Energy’s Contra Costa power plants with screens acceptable to the Fish and wildlife agencies.	Water Diversions	all R and r covered fish
<p>Actions to minimize or eliminate low dissolved oxygen conditions (DO sag) in lower San Joaquin River near Stockton (from Phase II Report):</p> <ul style="list-style-type: none"> • Complete studies of causes for DO sag in San Joaquin River near Stockton. • Define and implement corrective measures for DO sag. • Finalization of investigation of methods to reduce constituents that cause low DO for inclusion in total maximum daily load (TMDL) recommendation by the Central Valley RWQCB. • Finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River. • Implement appropriate source and other controls and other management practices, as recommended in the TMDL, to reduce anthropogenic oxygen depleting substances loadings and minimize or eliminate low DO conditions. 	dissolved oxygen, oxygen depleting substances, nutrients, total organic carbon (TOC)	Salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon
Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)	oxygen depleting substances, nutrients, TOC, ammonia	Salmonids, Sacramento splittail
Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
<p>Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.</p>	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following mercury evaluation and abatement work in the Cache Creek watershed (from Phase II Report):</p> <ul style="list-style-type: none"> • Support development and implementation of TMDL for mercury. • Determine bioaccumulation effects in creek and Delta. • Source, transport, inventory, mapping and speciation of mercury. • Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate. • Determine sources of high levels of bioavailable mercury 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following mercury evaluation and abatement work in the Delta (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine methylization (part of bioaccumulation) process in Delta. • Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work. • Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms. 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	selenium	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
Suisun Marsh and North San Francisco Bay		
Habitats		
Restore and maintain a minimum of three linear miles of riparian habitat along corridors of existing riparian scrub and shrub vegetation in each of the Ecological Management Units of the Suisun Marsh/North San Francisco Bay Ecological Management Zone.	Riparian and Riverine Aquatic Habitats	Sacramento splittail, all Central Valley salmonids, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>In the Suisun Marsh/North San Francisco Bay EMZ, restore a minimum of 7,000 acres of Saline Emergent Wetland by restoring tidal action in the Suisun Bay and Marsh Ecological Management Unit (including 200 acres of muted tidal marsh along the Contra Costa shoreline) and a cumulative total of 1,000 acres in the Napa River, Sonoma Creek, Petaluma River, and San Pablo Bay Ecological Management Units. Restore high marsh and high-marsh upland transition habitat in conjunction with restoration of saline emergent wetland. Develop cooperative programs to acquire, in fee-title or through a conservation easement, the land needed for tidal restoration, and complete the needed steps to restore the wetlands to tidal action. Begin aggressive program of control of non-native plant species that are threatening the known populations of Suisun thistle, Suisun Marsh aster, soft bird’s beak, and Point Reyes bird’s beak.</p> <ul style="list-style-type: none"> - Bring into protection at least 25% of currently occupied, but unprotected Suisun Marsh aster habitat, spread throughout the North, East, South Delta and Napa River Ecological Units, and ensure appropriate management. -Expand suitable tidal slough habitat for Suisun Marsh aster by 25 linear miles. -Identify at least three protected and managed sites for introduction of at least three additional populations of Suisun thistle; increase overall population size at least threefold. -Establish at least one new population of soft bird’s beak with high likelihood of success in restored habitat in each of the Suisun Bay and Marsh EMU, the Napa River EMU, and the Petaluma River EMU. -Establish at least one new Point Reyes bird’s beak population in the Petaluma River and San Pablo Bay EMUs. 	Saline Emergent Wetland	All Central Valley salmonids, delta smelt, longfin smelt, Sacramento splittail, Suisun song sparrow, San Pablo song sparrow, California Clapper rail, California black rail, Suisun thistle, soft bird’s beak, Point Reyes bird’s-beak, salt marsh harvest mouse, Suisun ornate shrew, San Pablo California vole, Suisun aster, salt marsh common yellow throat

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Restore suitable, occupied slough edge habitat for delta mudwort and delta tule pea by at least 5 miles in the Suisun Bay and Marsh EMU and by at least 10 miles in the Napa River EMUs.</p> <p>Bring at least 25% the currently existing but unprotected occurrences of delta mudwort and delta tule into protection through purchase or conservation agreement, and ensure appropriate management.</p>	Saline Emergent Wetland	all Central Valley salmonids, delta smelt, Sacramento splittail, California black rail, Mason’s lilaeopsis, delta mudwort, delta tule pea
<p>In the Suisun Marsh/North San Francisco Bay Ecological Management Zone, restore and manage a minimum of 500 acres of seasonal wetland, and improve management of a minimum of 7,000 acres of existing, degraded seasonal wetland in a manner that provides suitable habitat for salt marsh harvest mouse, San Pablo California vole, and Suisun ornate shrew.</p>	Seasonal Wetlands	salt marsh harvest mouse, San Pablo California vole, Suisun ornate shrew
<p>Restore a minimum of 400 acres of tidal perennial aquatic habitat in the Suisun Marsh/North San Francisco Bay Ecological Management Zone.</p>	Tidal Perennial Aquatic Habitat	all Central Valley salmonids, delta smelt, Sacramento splittail, longfin smelt

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop a cooperative program to acquire, manage and restore 100 acres of vernal pools and 500 to 1,000 acres of adjacent buffer areas in the Suisun Marsh/North San Francisco Bay EMZ.</p> <p>Protect all existing known occurrences of Crampton’s tuctoria through conservation easement or purchase from willing sellers (including CNDDDB Element Occurrence #2 and any new populations that are found). Identify at least two protected and managed sites for introduction of additional populations; begin introduction and monitor for success.</p> <p>Manage at least 250 acres of the ERP target for vernal pools near the Jepson Prairie preserve as suitable habitat for alkali milk vetch. Establish new populations on protected and appropriately managed lands. Bring 50% of currently unprotected, existing populations into protection through purchase or conservation agreement, and ensure appropriate management.</p>	Vernal Pools	Delta green ground beetle, Crampton’s tuctoria, Alkali milk- vetch
<u>Stressors Reduction</u>		
Develop a program to consolidate, screen, or eliminate 25% of the unscreened diversions in Suisun Marsh.	Water Diversions	all R and r covered fish
Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)	oxygen depleting substances, nutrients, TOC, ammonia	Salmonids, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	<p>carbofurans, chloropyrifos, diazinon</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.</p>
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	<p>selenium</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	<p>chlorodane, DDT, PCBs, toxaphene</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake</p>
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	<p>cadmium, copper, zinc</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Conduct the following unknown toxicity work (from Phase II Report): <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
Sacramento River Basin		
<u>Ecological Processes</u>		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Construct a network of channels totaling 20 miles within the Sutter and Yolo Bypasses that effectively drains flooded lands after floodflows stop entering the bypasses. The channels should be designed to allow juvenile anadromous and resident fish to move from rearing and migratory areas.</p> <p>Develop and begin implementation of a program in the Yolo Basin to restore channel-floodplain connectivity and floodplain processes. Design natural stream channel configurations and expand floodplain overflow areas in the lower Cache and Putah Creek floodplains, as well as in channels and sloughs of the upper Yolo Bypass to provide connections with the Delta in a manner consistent with flood control requirements. Diversions (water source) into the Yolo Basin should not result in direct or indirect adverse impacts to salmonids. Project design features would include sloughs and creek channels, setback levees, and wetlands, where feasible and consistent with flood protection.</p>	Natural Floodplain and Flood Processes	Central Valley chinook salmon and steelhead, Sacramento splittail
<p>Develop and implement temperature management programs within major tributaries in the Sacramento River Basin. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.</p>	Central Valley Stream Temperatures	Central Valley fall/late fall-run chinook salmon and steelhead

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement a program to address the thermal impacts of irrigation return flows in the Sacramento River Basin. The goal of the program should be achieve Basin Plan objectives for water temperature. The program should include provisions to: a) identify locations of irrigation return flows with thermal impacts; b) develop measures to avoid or eliminate thermal impacts from irrigation return flows; and c) prioritize problem sites based on impacts to chinook salmon and steelhead. If feasible, proceed with implementation of some or all actions to address thermal impacts of irrigation return flows.</p>	<p>Central Valley Stream Temperatures</p>	<p>Central Valley fall/late fall-run chinook salmon and steelhead</p>
<p>Design and begin implementation of an ecologically based streamflow regulation plan for Yuba River, Butte Creek, Big Chico Creek, Deer Creek, Mill Creek , Antelope Creek, Battle Creek, Cottonwood Creek, and Clear Creek.</p>	<p>Central Valley Streamflow</p>	<p>all Central Valley salmonids, green sturgeon, Sacramento splittail, western yellow-billed cuckoo, yellow warbler, Least Bell’s vireo</p>
<p>Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within each EMZ in the Sacramento River Basin.</p>	<p>Coarse Sediment Supply</p>	<p>all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Norther California black walnut</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within each of the EMZs in the Sacramento River Basin. Among the areas to be included are the lower 10 miles of Clear Creek, Antelope Creek, and Deer Creek, and the lower reach of Cottonwood Creek.	Natural Floodplain and Flood Processes	all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut
Protect 15,000 acres within the Inner River Zone areas between Red Bluff and Colusa reaches within identified the Sacramento River Conservation Area. Establish between 3 and 5 habitat preserves for bank swallows along the upper reaches of the Sacramento River capable of supporting 5000 bank swallow burrows between the towns of Colusa and Red Bluff.	Stream Meander	all Central Valley salmonids, steelhead, western yellow-billed cuckoo, Least Bell’s vireo, Swainson’s hawk, Valley elderberry longhorn beetle, bank swallow
<u>Habitats</u>		
In the American River Basin, Butte Basin, Colusa Basin, Feather River/Sutter Basin EMZs, cooperatively enhance at least 15 to 25% of the ERPP target for wildlife friendly agricultural practices.	Agricultural Lands	greater sandhill crane, giant garter snake, Swainson’s hawk

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat, and instream cover along at least one tributary within each of the following Ecological Management Zones: American River Basin, Butte Basin, Colusa Basin, Cottonwood Creek, Feather River/Sutter Basin, North Sacramento Valley, Sacramento River, and Yolo Basin. While restoring habitat conditions in the American River EMZ, maintain continuous corridors of suitable riparian habitat for valley elderberry longhorn beetle.</p> <p>Protect existing known occurrences of northern California black walnut native stands through conservation easement or purchase.</p> <p>Identify at least 3 protected and managed sites for introduction of additional populations of northern California black walnut; begin introduction and monitor for success. Population creation should be part of a broader effort to restore riparian areas which historically contained walnut.</p>	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, western yellow-billed cuckoo, Valley elderberry long-horn beetle, California yellow warbler, Least Bell’s vireo, little willow flycatcher
<p>In the Cottonwood Creek EMZ, complete (1) long-term agreements with local landowners to establish, restore, and maintain riparian communities along 25 percent of the upper and 25 percent of the lower reaches of Cottonwood Creek, and (2) the development of a comprehensive watershed management plan that supports local land use decisions to protect existing riparian and restore lost riparian.</p>	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, little willow flycatcher

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Restore 2 miles of the 10 mile target of riparian habitat restoration along the lower reaches of each of the following tributaries: Battle, Clear, Deer, Mill, Butte, Big Chico, Antelope, Feather, Yuba, and Bear Rivers.	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, California yellow warbler, western yellow-billed cuckoo, little willow flycatcher, Least Bell’s vireo, Valley elderberry long-horn beetle
Implement 25 percent of the ERP target for enhancing, protecting, and restoring seasonal wetlands in the following EMZs: American River Basin, Butte Basin, Colusa Basin, and Feather River/Sutter Basin.	Seasonal Wetlands	greater sandhill crane, Swainson’s hawk, giant garter snake
<u>Stressors Reduction</u>		
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within Sacramento River Basin tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	all Central Valley salmonids, green sturgeon, Sacramento splittail
Provide unimpeded upstream and downstream passage for salmon and steelhead on Sacramento River Basin tributaries.	Dams and Other Structures	all Central Valley salmonids, green sturgeon, Sacramento splittail
On Big Chico Creek, repair the Lindo Channel weir and fishway at the Lindo Channel box culvert at the Five Mile Diversion to improve upstream fish passage.	Dams and Other Structures	all Central Valley salmonids
Develop and implement a solution to improve passage of upstream migrant adult fish and downstream migrant juvenile fish Battle Creek.	Dams and Other Structures	all Central Valley salmonids, green sturgeon
Evaluate the feasibility of constructing fish passage facilities at the Grays Bend-Old River-Freemont weir complex at the upper end of the Yolo Bypass.	Dams and Other Structures	all Central Valley salmonids

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop a program to reduce or eliminate fish stranding in the Sacramento, Feather and Yuba rivers and the Colusa Basin drain and Sutter Bypass in the active stream channels, floodplains, shallow ponds and borrow areas. Develop protocols for ramping flow reductions. Conduct surveys of stranding under a range of flow conditions and recommend solutions.</p>	Stranding	all Central Valley salmonids, green sturgeon, longfin smelt, Sacramento splittail
<p>Install positive barrier fish screens on all diversions greater than 250 cfs in all EMZs and 25% of all smaller unscreened diversions in the Sacramento River Basin. Among those diversions to be screened are the DWR Pumping Plants and 50% of small diversion located on east side of Sutter Bypass, the Bella Vista diversion in the upper Sacramento River near Redding, East-West Diversion Weir, Weir 5, Weir 3, Guisti Weir and Weir 1 in the Sutter Bypass, White Mallard Dam, Morton Weir, Drivers Cut Outfall and Colusa Shooting/Tarke Weir Outfall and associated diversion screens in the Butte Sink..</p>	Water Diversions	all R and r covered fish
<p>Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)</p>	oxygen depleting substances, nutrients, TOC, ammonia	Salmonids, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate inter-substrate low dissolved oxygen conditions in salmonid spawning and rearing habitat, especially in the Mokelumne, Cosumnes, American, Merced, Tuolumne, and Stanislaus Rivers (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Develop inter-substrate DO testing for salmonid spawning and rearing habitat. • Conduct comprehensive surveys to assess the extent and severity of inter-substrate low DO conditions. • Develop and begin implementing appropriate best management practices (BMPs), including reducing anthropogenic fine sediment loads, to minimize or eliminate inter-substrate low DO conditions. 	<p>dissolved oxygen, turbidity/ sedimentation</p>	<p>Salmonids</p>
<p>Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)</p>	<p>dissolved oxygen, oxygen depleting substances, nutrients</p>	<p>Salmonids, Sacramento splittail</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
<p>Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.</p>	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following mercury evaluation and abatement work in the Cache Creek watershed (from Phase II Report):</p> <ul style="list-style-type: none"> • Support development and implementation of TMDL for mercury. • Determine bioaccumulation effects in creek and Delta. • Source, transport, inventory, mapping and speciation of mercury. • Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate. • Determine sources of high levels of bioavailable mercury 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following mercury evaluation and abatement work in the Sacramento River (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine, inventory, and sources of high levels of bioavailable mercury • Refine mercury models. • Participate in remedial activities. 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
San Joaquin River Basin		
Ecological Processes		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement temperature management programs within major tributaries in the San Joaquin River Basin. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.</p>	<p>Central Valley Stream Temperatures</p>	<p>Central Valley fall/late fall-run chinook salmon and steelhead</p>
<p>Develop and implement a program to address the thermal impacts of irrigation return flows in the San Joaquin River Basin. The goal of the program should be achieve Basin Plan objectives for water temperature. The program should include provisions to: a) identify locations of irrigation return flows with thermal impacts; b) develop measures to avoid or eliminate thermal impacts from irrigation return flows; and c) prioritize problem sites based on impacts to chinook salmon and steelhead. If feasible, proceed with implementation of some or all actions to address thermal impacts of irrigation return flows.</p>	<p>Central Valley Stream Temperatures</p>	<p>Central Valley fall/late fall-run chinook salmon and steelhead</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within each EMZ within the San Joaquin River Basin. In the East San Joaquin Basin EMZ, complete fluvial geomorphic assessments on all tributaries.</p>	<p>Coarse Sediment Supply</p>	<p>all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Northern California black walnut</p>
<p>Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within each of the EMZs in the San Joaquin River Basin. Among the areas to be included are at least 10 miles of stream channel in the West San Joaquin EMZ.</p>	<p>Natural Floodplain and Flood Processes</p>	<p>all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut</p>
<p>Develop a cooperative program to restore salmonid spawning and rearing habitat in the Tuolumne, Stanislaus, and Merced Rivers that includes the following elements: (1) reconstructing channels at selected sites by isolating or filling in inchannel gravel extraction areas; (2) increasing natural meander by removing riprap and relocating other structures that impair stream meander; and (3) restoring more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.</p>	<p>Stream Meander (also Predation and Competition)</p>	<p>Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, California yellow warbler, bank swallow</p>
<p>Restore and maintain a defined stream-meander zone and increase floodplain habitat on the San Joaquin River between Vernalis and the mouth of the Merced River.</p>	<p>Stream Meander</p>	<p>Sacramento splittail, Central Valley fall/late fall-run chinook salmon, steelhead, bank swallow</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Establish a river meander corridor between the Chowchilla Bypass and Mendota Pool to expand the floodway corridor to convey increased anticipated floodflows and restore floodplain habitat.	Stream Meander	Sacramento splittail, Central Valley fall/late fall-run chinook salmon, steelhead, bank swallow
Habitats		
In the San Joaquin River and West San Joaquin Basin EMZs, cooperatively enhance at least 15 to 25% of the ERPP target for wildlife friendly agricultural practices	Agricultural Lands	Swainson’s hawk, greater sandhill crane, giant garter snake
In the West San Joaquin Basin EMZ, restoring or create 100 acres of fresh emergent wetland habitat.	Fresh Emergent Wetland	giant garter snake
In the West San Joaquin Basin EMZ, restore or enhance 1,000 acres of perennial grassland associated with existing or proposed wildlife corridors, wetlands, or floodplain habitats.	Perennial Grasslands	Swainson’s hawk, greater sandhill crane
Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat and instream cover along at least one tributary within the East San Joaquin and San Joaquin River EMZs.	Riparian and Riverine Aquatic Habitats	Central Valley steelhead, fall/late fall-run chinook salmon, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher, delta coyote thistle

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Implement 25 percent of the ERP target for diverse, self-sustaining riparian community for all EMZs in the San Joaquin River Basin.</p> <p>Bring at least three of the currently existing but unprotected delta coyote thistle occurrences into protection through purchase or conservation agreement, and ensure appropriate management.</p> <p>Increase suitable habitat for delta coyote thistle by at least 20% and the number of populations and individuals by at least 10% through habitat management and protection.</p> <p>Establish two new riparian brush rabbit habitat preserves within the historical range of the species. Protect and enhance a minimum of 150 contiguous acres of mature, shrub-rich riparian forest and associated highwater refugia on the San Joaquin River, between the Merced River confluence and Vernalis, and on each of the east-side tributaries (the Stanislaus, Tuolumne and Merced rivers) for habitat values and as potential riparian brush rabbit re-introduction sites.</p>	<p>Riparian and Riverine Aquatic Habitats</p>	<p>San Joaquin Valley woodrat, delta coyote thistle, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit</p>
<p><u>Stressors Reduction</u></p>		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within San Joaquin River tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon, green sturgeon, Sacramento splittail
Provide unimpeded upstream and downstream passage for salmon and steelhead on San Joaquin River Basin tributaries.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon
Initiate a feasibility study of restoring steelhead migration into upper watershed areas (e.g., upstream of major low-elevation dams) in at least one San Joaquin River Basin EMZ Tributary.	Dams and Other Structures	steelhead
Install positive barrier fish screens on all diversions greater than 250 cfs in all EMZs and 25% of all smaller unscreened diversions in the San Joaquin River Basin. Among those diversions to be screened are the El Solyo, Patterson, and West Stanislaus irrigation district diversions.	Water Diversions	all R and r covered fish

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate low dissolved oxygen conditions (DO sag) in lower San Joaquin River near Stockton (from Phase II Report):</p> <ul style="list-style-type: none"> • Complete studies of causes for DO sag in San Joaquin River near Stockton. • Define and implement corrective measures for DO sag. • Finalization of investigation of methods to reduce constituents that cause low DO for inclusion in total maximum daily load (TMDL) recommendation by the Central Valley RWQCB. • Finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River. • Implement appropriate source and other controls and other management practices, as recommended in the TMDL, to reduce anthropogenic oxygen depleting substances loadings and minimize or eliminate low DO conditions. 	<p>dissolved oxygen, oxygen depleting substances, nutrients, total organic carbon (TOC)</p>	<p>Salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon</p>
<p>Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)</p>	<p>oxygen depleting substances, nutrients, TOC, ammonia</p>	<p>Salmonids, Sacramento splittail</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate inter-substrate low dissolved oxygen conditions in salmonid spawning and rearing habitat, especially in the Mokelumne, Cosumnes, American, Merced, Tuolumne, and Stanislaus Rivers (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Develop inter-substrate DO testing for salmonid spawning and rearing habitat. • Conduct comprehensive surveys to assess the extent and severity of inter-substrate low DO conditions. • Develop and begin implementing appropriate best management practices (BMPs), including reducing anthropogenic fine sediment loads, to minimize or eliminate inter-substrate low DO conditions. 	dissolved oxygen, turbidity/ sedimentation	Salmonids
<p>Assess the ecological effects of low DO conditions in Suisun Marsh due to adding oxygen-depleted water from anthropogenic sources (from Water Quality Program Plan).</p>	dissolved oxygen, oxygen depleting substances, nutrients, TOC	Delta smelt, Sacramento splittail, longfin smelt, salmonids, green sturgeon
<p>Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)</p>	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail

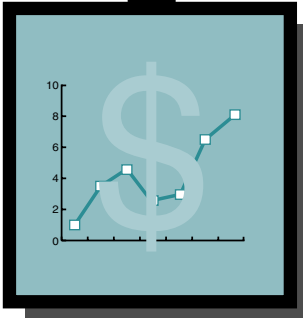
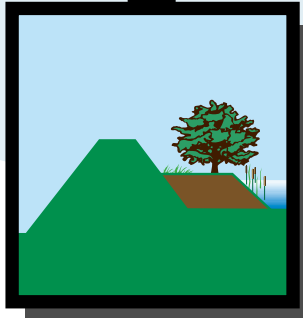
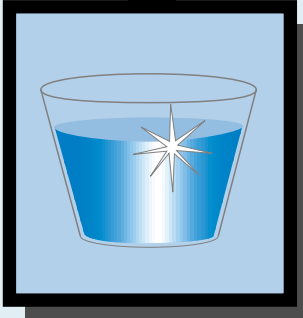
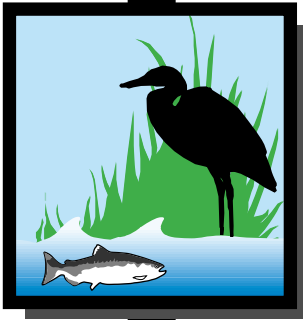
Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
<p>Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.</p>	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	selenium	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
Research Milestones		
<p>Develop and implement a comprehensive monitoring, assessment and research program (CMARP) for terrestrial and aquatic habitats and species populations acceptable to the fish and wildlife agencies. Conduct rangewide surveys for all “R” and “r” covered plants and animals in the MSCS Focus Area.</p>		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop and begin implementation of a study to determine appropriate conditions for the germination and establishment of riparian woody plants along the Sacramento River and San Joaquin River. Complete development of a cooperative program to plant vegetation on unvegetated riprapped banks consistent with flood control requirements.		
Conduct a study to investigate the effects of the road through Olcott Lake on vernal pool hydrology and impacts on vernal pool species.		
Conduct instream flow studies to determine the flows necessary to support all life stages of anadromous and estuarine fish species.		
Conduct an investigation of in-channel structures that focuses on the following issues: (1) habitat suitability for both predator and prey fishes; (2) predator-prey interactions; and (3) recommendations for reducing predation on juvenile salmonids.		
Conduct experimental introductions of Sacramento perch into nontidal perennial aquatic habitats		
Assess the impact of hatchery practices on naturally spawning populations of chinook salmon and steelhead and operate hatcheries in a manner consistent with safe genetic practices that will maintain genetic integrity of all Central Valley anadromous salmonid populations.		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Through the use of existing, expanded, and new programs, monitor adult anadromous salmonid returns to each watershed within the MSCS focus area. Monitoring techniques, data compilation and analysis, and reporting should be standardized among researchers and watersheds to the greatest extent possible.</p>		



CALFED
BAY-DELTA
PROGRAM

Attachment 7

Natural Community Conservation Plan Determination

August 28, 2000

Natural Community Conservation Plan Approval

California Department of Fish and Game Approval and Supporting Findings for the CALFED Bay Delta Program Multiple Species Conservation Strategy

I. Introduction

A. The Natural Community Conservation Planning Act

The **Natural Community Conservation Planning Act** (NCCPA), California Fish & Game Code §2800, et seq.,¹ authorizes the preparation and implementation of large-scale natural resource conservation plans. A **natural communities conservation plan**, or NCCP, must identify and provide for "the regional or area wide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth." (§2805(a).) NCCPs are intended "to provide comprehensive management and conservation of multiple wildlife species" including, but not limited to, species listed pursuant to the **California Endangered Species Act**, §2050, et seq. (§2810.) (CESA).

The NCCPA promotes cooperation and coordination among public agencies, landowners, and other private interests in developing NCCPs. The **California Department of Fish and Game** (DFG) is authorized to prepare and implement NCCPs with a wide variety of private and public interests, including individuals, organizations, companies, and State and local government agencies. (§2810 and §711.2.) Natural community conservation planning may be undertaken by local, State, and Federal agencies independently or in cooperation with other individuals and entities (§2820.)

An NCCP must be approved by DFG before it is implemented (§2820.) To be approved, an NCCP must meet standards established by DFG. (§2820.) DFG is authorized to prepare non-regulatory guidelines to establish NCCP standards and to guide the development and implementation of NCCP Plans (§2825(a).) NCCPs are also subject to review under the California Environmental Quality Act, Public Resources Code §21000, et seq.

DFG may authorize the "taking" of any identified species, including endangered species and threatened species, whose conservation and management is provided for in a DFG approved NCCP Plan (§2835.) Under the Fish and Game Code, "Take" means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." (§86.)

Because the NCCPA allows DFG to authorize incidental take of endangered species and threatened species, an NCCP may be used to comply with CESA.

B. The CALFED Bay-Delta Program

In 1994, the Governor's Water Policy Council of the State of California and the Federal Ecosystem Directorate entered into a Framework Agreement to establish a comprehensive program for coordination and communication with respect to environmental protection and water supply dependability in the San Francisco Bay/San Joaquin River Bay-Delta Estuary. This Framework Agreement served as the basis for the **CALFED Bay-Delta Program** (CALFED Program).

The CALFED Program is a cooperative effort of **eighteen State and Federal agencies with regulatory and management responsibilities in the Bay-Delta** (the "CALFED agencies") to develop a long-term plan to restore ecosystem health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program's objective is to identify comprehensive solutions to the problems of ecosystem quality, water supply reliability, water quality, and Delta levee and channel integrity.

The CALFED Program's mission is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program is also guided by solution principles adopted by CALFED agencies. According to these principles, a successful program solution must reduce conflicts in the system, be equitable, be affordable, be durable, be implementable, and have no significant redirected impacts.

The CALFED Program is described in greater detail below.

C. The Multi-Species Conservation Strategy

The **Multi-Species Conservation Strategy** (MSCS) has been submitted to DFG for approval as an NCCP for the CALFED Program. The MSCS is an approach that entities implementing CALFED actions may use to fulfill the requirements of the **Federal Endangered Species Act** (FESA), CESA, and the NCCPA.

Specifically, the MSCS:

- < analyzes CALFED's effects on 244 "evaluated species" and 20 natural communities ("NCCP communities") — comprising 18 habitats and two ecologically based fish groups comprised of anadromous and estuarine fish species for FESA, CESA, and NCCPA purposes;
- < identifies species goals ("recovery", "contribute to recovery", or "maintain") for each of the 244 evaluated species, as well as conservation measures to achieve the goals;
- < identifies goals for each of the 20 NCCP communities, as well as conservation measures to achieve the goals; and
- < provides for the preparation of **Action Specific Implementation Plans** (ASIPs), which will strengthen and simplify the CALFED Program's compliance with FESA, CESA, and NCCPA.

The MSCS contains two types of conservation measures:

- < measures to avoid, minimize, and compensate for adverse effects to NCCP communities and evaluated species caused by individual program actions; and
- < measures to enhance NCCP communities and evaluated species that are not directly linked to adverse effects from program actions.

The MSCS features a two-tiered approach to FESA, CESA, and NCCPA compliance that corresponds to CALFED's two-tiered approach to compliance with the **National Environmental Policy Act** (NEPA) and the **California Environmental Quality Act** (CEQA). The MSCS provides a program-level evaluation of the CALFED Program under FESA and NCCPA, just as the July 2000 **Final Programmatic Environmental Impact Statement/Environmental Impact Report for the CALFED Bay-Delta Program** (Final Programmatic EIS/EIR) provides a program-level evaluation under NEPA and CEQA. ASIPs are intended to complement the second-tier, project-level environmental review of program actions that is anticipated in the Final Programmatic EIS/EIR.

Because it is a comprehensive regulatory compliance strategy and is integrated with the Final Programmatic EIS/EIR, the MSCS helps assure that CALFED can complete actions in accordance with FESA, CESA, and NCCPA, and that the compliance process will be systematic, efficient, and predictable. Neither the MSCS, nor this NCCPA Program Approval, will give the CALFED Program general authority to take endangered or threatened species. However, the MSCS's compliance process enables program implementing entities to obtain authorizations under FESA and NCCPA that allow incidental take of Covered Species caused by specific program actions.

1. Conservation Goals approach

The MSCS assigns a goal to each MSCS evaluated species. The three alternative goals are recovery (R), contribute to recovery (r), and maintain (m).

- < A goal of "recovery" was assigned to those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh ecosystems and for which the CALFED Program could reasonably be expected to undertake all or most of the actions necessary to recover the species. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species' long-term survival in nature is assured.
- < The goal "contribute to recovery" was assigned to species for which program actions affect only a limited portion of the species' range and/or program actions have limited effects on the species. To achieve the goal of contributing to a species' recovery, the CALFED Program will undertake some of the actions under its control and within its scope that are necessary to recover the species. When a species has a recovery plan, the CALFED Program may implement both plan measures that are within the Problem Area and some measures that are outside the Problem Area. For species without a recovery plan, the CALFED Program will need to implement specific measure that will benefit the species.
- < The goal "maintain" was assigned to species expected to be affected minimally by program actions. The MSCS requires that the CALFED Program avoid, minimize, and compensate for the adverse effects of its actions on species in this category. The avoidance, minimization, and compensation measures for these species may not contribute to their recovery, but will ensure that program actions will not degrade the species' status or contribute to the need to list the species. In addition, the CALFED Program is expected to take advantage of opportunities to improve conditions for these species where practicable.

The MSCS also describes goals for 20 NCCP communities, which include two fish groups. The goals for the two NCCP fish groups and most of the other 18 natural communities were developed within the **Ecosystem Restoration Program** (ERP) and the **Strategic Plan for Ecosystem Restoration** (Strategic Plan). Goals for NCCP communities not addressed by the ERP are predicated on the fisheries and aquatic ecosystems and vegetation and wildlife strategies in the Final Programmatic EIS/EIR.

2. Scope of the Multi-Species Conservation Strategy

The scope of the MSCS is defined by two factors:

- < the geographic area encompassed by CALFED actions and;
- < the habitats and species evaluated in the MSCS.

a) Geographic scope

As described in Chapter 1 of the Final Programmatic EIS/EIR, the geographic scope of the CALFED Program includes two distinct areas, the "**Problem Area**" and the "**Solution Area**". The Problem Area is defined as the legal Delta and Suisun Bay and Marsh. The Solution Area is much broader in extent than the Problem Area; it encompasses the Central Valley watershed, the upper Trinity River watershed, the southern California water system service area, San Pablo Bay, San Francisco Bay, portions of the Pacific Ocean out to the Farallon Islands, and a near-shore coastal zone that extends from about Morro Bay to the Oregon border.

The CALFED Program will affect a very large geographic area and the range of effects varies greatly. The MSCS addresses four distinct geographic subareas of the CALFED Program Problem and Solution Areas. These areas are the:

- < **MSCS Focus Area.** This area includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries downstream of major dams, and the potential locations of reservoirs. This is the same as the focus study area of the ERP, with the addition of the potential reservoir sites under consideration as part of the CALFED Program.
- < **Other Service Areas.** Other **State Water Project (SWP)** and **Central Valley Project (CVP)** service areas that are located outside of the MSCS Focus Area and the Watershed Program Area. Potential effects in these service areas cannot be determined until individual program actions or groups of actions are identified and defined.

- < **Watershed Program Area.** This area encompasses the watersheds of the CALFED Program Solution Area, but the CALFED Program focuses on the watersheds of the San Joaquin and Sacramento Rivers, including those areas located above major dams and outside the Focus Area, and a portion of the upper Trinity River watershed. Restoration and management actions implemented through the Watershed Program can yield other benefits, such as water quality and other streamflow improvements and reductions in reservoir sedimentation. At this time, specific information is not available about possible CALFED Program Watershed actions and their potential effects on MSCS Evaluated Species (see explanation of Evaluated Species below).

- < **Outer Bay Region.** This area encompasses near-shore coastal areas used by some of the evaluated species. This area is not analyzed in the MSCS because program actions do not extend into that area.

b) Evaluated Species and Covered Species

CALFED agencies have identified more than 400 species that use the Focus Area. This list was reduced to 244 Evaluated Species that either could be affected by program actions or are listed under FESA or CESA. The ERP describes targets and programmatic actions for many of the evaluated species. However, for purposes of FESA, CESA, and NCCPA compliance, USFWS, NMFS, and DFG, in consultation with CALFED, developed separate MSCS species goals that reflect applicable regulatory standards. The USFWS, NMFS and DFG also developed a list of MSCS "conservation measures." Most of the MSCS conservation measures were refinements of ERP actions that are now incorporated within the ERP. Some additional conservation measures were also incorporated within the ERP.

Based on the MSCS, the ERP, and other relevant parts of CALFED, DFG has identified a list of "Covered Species." DFG's list of Covered Species includes the Evaluated Species that DFG has determined will be adequately conserved by the MSCS in accordance with the NCCPA. Pursuant to the NCCPA, a species is adequately conserved by the MSCS if it includes conservation methods and procedures that are adequate to protect and perpetuate a the species within the Focus Area, taking into consideration the whole of the CALFED Program, including the direct and indirect effects of program actions.

Covered species include species for which take authorization could be issued for actions that follow the MSCS compliance process as described in Chapter 6 of the MSCS, as well as species for which take authorization cannot be issued. For example,

incidental take of extremely rare species will not be authorized. In addition, incidental take will not be authorized where prohibited by certain laws other than FESA or CESA, such as provisions of the California Fish and Game Code for “fully protected” species and “specified birds.” (See, §3505, §3511, §4700, §5050, and §5515.)

3. Adaptive Management, Monitoring and Reporting

The CALFED Program addresses a broad range of species and habitat types throughout a large area, and encompass numerous large-scale, long-term actions. In preparing the MSCS and ERP, the CALFED Program has used the best available scientific information and collected input from a broad array of experts; however, it is likely that some proposed measures will fail to achieve their objectives. Other measures that achieve some success may, nonetheless, not provide the best solutions to the problems addressed.

The ROD establishes the CALFED Science Program, which will bring world-class science to all elements of the CALFED Program. The Science Program will be developed and directed by an interim lead scientist, who will also serve in the role of lead scientist during the initial years of CALFED Program implementation. Implementation of the Science Program includes implementation of the Comprehensive Monitoring, Assessment, and Research Program (CMARP), now under the direction of the interim lead scientist.

In recognition of the uncertainties inherent in any program of this magnitude, the CALFED Program includes provisions for applying an adaptive management process based on comprehensive monitoring and assessment of program implementation. This process ensures that the CALFED Program and the MSCS can be modified, as appropriate, to use consistently the best information regarding evaluated species and the most effective, practical means for achieving their goals. For the CALFED Program as a whole, the Science Program will help refine program actions based on monitoring results. The adaptive management components of the MSCS are described in Chapter 7 and Chapter 8 of the MSCS. These chapters describe how the CALFED Program will periodically evaluate the effectiveness of the conservation measures and modify these measures when necessary.

D. The Conservation Agreement

CALFED agencies that will approve, fund or implement program actions have entered into the “CALFED Bay-Delta Program Conservation Agreement regarding the Multi-Species Conservation Strategy” dated August 28, 2000 (the “Conservation Agreement”). The purpose of the Conservation Agreement is to define the CALFED agencies’ commitments with respect to

the MSCS and the CALFED Program ' s compliance with FESA, CESA and the NCCPA. This NCCPA Program Approval is based in large part on the commitments of the CALFED agencies in the Conservation Agreement. The Conservation Agreement is incorporated herein by reference.

E. The Effect of this NCCPA Program Approval

This NCCPA Program Approval is DFG ' s determination that the MSCS satisfies the requirements of the NCCPA for a programmatic NCCP. DFG has determined that the MSCS identifies and provides for the regional or areawide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth. If implemented in accordance with the MSCS and the Conservation Agreement, the CALFED Program will achieve the goals of the MSCS and will comply with the NCCPA and CESA. This NCCPA Program Approval does not authorize incidental take of any species of fish, plant or wildlife, nor does it authorize any specific program action. Specific program actions have not been proposed or submitted to DFG for review under CESA or the NCCPA. However, once specific program actions have been developed, they may obtain incidental take authorization for Covered Species under a simplified regulatory compliance process established in the MSCS. In accordance with this process, DFG will evaluate each program action as a component of the MSCS, not as an isolated project, when determining whether the action complies with the NCCPA and CESA. If a proposed program action implements and adheres to the MSCS, it may be carried out in compliance with the NCCPA and CESA. Provided the CALFED Program continues to be implemented in accordance with the MSCS and the Conservation Agreement, program actions may use the MSCS to comply with the NCCPA and CESA.

F. Basis for NCCPA Program Approval

This NCCPA Program Approval is based on information, analyses, and conclusions contained in DFG files, and in the following documents

- < MSCS, dated July 2000
- < Conservation Agreement, dated August 28, 2000
- < CALFED Bay-Delta Program Programmatic Record of Decision, dated August 28, 2000
- < Final Programmatic EIS/EIR, dated July 2000
- < Implementation Plan, dated July 2000
- < Phase II Report, dated July 2000
- < Ecosystem Restoration Program, Volume I and Volume II, dated July 2000
- < Strategic Plan For Ecosystem Restoration, dated July 2000
- < Ecosystem Restoration Program Maps, dated July 2000
- < Levee System Integrity Program Plan, dated July 2000

- < Water Quality Program Plan, dated July 2000
- < Water Use Efficiency Program Plan, dated July 2000
- < Water Transfer Program Plan, dated July 2000
- < Watershed Program Plan, dated July 2000
- < Comprehensive Monitoring, Assessment and Research Program Plan, dated July 2000
- < Response to Comments, Vol. I, Impact Analysis, dated July 2000
- < Response to Comments, Vol. II, Technical Appendices, dated July 2000
- < Response To Comments, Vol.III, Comment Letters and Testimony, dated July 2000
- < The National Marine Fisheries Service Biological Opinion for the Program, dated August, 2000
- < The United States Fish & Wildlife Service Biological Opinion for the Program, dated August, 2000

II. The CALFED Bay-Delta Program

A. Description of the Proposed Action

The CALFED Program is a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Program addresses issues in four general problem areas: ecosystem quality, water quality, water management, and levee system integrity. The following CALFED Program elements were developed to solve issues in the problem areas:

- < Levee System Integrity Program
- < Water Quality Program
- < Ecosystem Restoration Program
- < Water Use Efficiency Program
- < Water Transfer Program
- < Watershed Program
- < Storage
- < Conveyance
- < Environmental Water Account
- < Science Program
- < Multi-Species Conservation Strategy
- < Governance

Most CALFED Program elements are described in technical appendices to the Final Programmatic EIS/EIR. Storage and Conveyance are described separately. The EWA is an operational strategy intended to improve fish protection while not adversely affecting water supply.

All aspects of the CALFED Program are interrelated and interdependent. Ecosystem restoration is dependent upon supply and conservation. Supply is dependent upon water use efficiency and consistency in regulation. Water quality is dependent upon water use efficiency and consistency in regulations, improved conveyance, levee stability and healthy watersheds.

The CALFED Program includes a framework guiding implementation that addresses the scope, complexity, and duration of the CALFED Program, and the relative uncertainty regarding the CALFED Program's approach in resolving issues in the problem areas. Implementation is supported by an Implementation Plan that describes Stage 1 actions, CALFED Program integration, governance, and financing. In addition, a Science Program is included to carry out monitoring, assessment and research; and a MSCS will be followed to achieve compliance with the ESA. Implementation of the CALFED Program will be guided by an adaptive management approach with monitoring of performance to help modify (adapt) future actions and contribute to decision making. Also, the CALFED Program will be guided by the principle of balanced implementation of CALFED Program elements.

The term of this NCCPA Program Approval includes Phase III of the CALFED Program (30 years or more), provided the CALFED Program remains in compliance with this NCCPA Program Approval. DFG will evaluate the CALFED Program's consistency with this NCCPA Program Approval at numerous points in the future, including:

- < During review of annual reports submitted by the CALFED Program.
- < During subsequent, tiered informal and formal consultation on ASIPs.
- < After 4 years of implementation when sufficient data is collected and analyzed to fully evaluate the effectiveness of the WMS, together with other conservation elements, in meeting the conservation objectives of the CALFED Program.
- < At the conclusion of Stage 1 to assess the Program's compliance in achieving the conservation objectives established in the CALFED "Milestones."

If DFG determines that the CALFED Program is not in compliance with this NCCPA Program Approval, the CALFED Agencies will reinstate this NCCPA Program Approval. In addition, refer to the suspension and withdrawal of NCCPA Program Approval statement for further reasons for reinstatement.

The following sections describe the CALFED Program and its elements in greater detail.

Levee System Integrity Program

The Levee System Integrity Program's goal is to improve levees and levee management in the legal Delta and will investigate the level of levee work in Suisun Marsh, which together define its

scope. All projects under the Levee System Integrity Program will be implemented to be fully consistent with other CALFED Program elements, including the ERP, Conveyance, and MSCS. Project-specific plans will incorporate appropriate elements of these other programs and strategies. Individual projects pursued under the Levee System Integrity Program, including each of the levee plans described below, will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under NCCPA and/or CESA and section 7 or section 10 of the ESA. The Levee System Integrity Program is comprised of the following five elements in the Delta, and a plan for Suisun Marsh levees:

Delta Levee Base Level Protection Plan. The CALFED Program will provide funding to participating local agencies in the Delta to reconstruct certain Delta levees to a uniform, base-level standard. The tentative standard is the Public Law (PL) 84-99 Delta Specific Standard (PL 84-99). Constructing levees to the PL 84-99 criteria is a prerequisite for, but not a guarantee of, post-flood Federal disaster assistance. This plan will evaluate the estimated 520 miles of non-Federal levees in the Delta and recommend levee segments that should conform with the Delta Specific Standard criteria. In addition, a funding mechanism will be established to support the routine inspection and maintenance of levees in the Delta, and for emergency response.

Delta Levee Special Improvement Projects. These projects will target areas that will provide flood protection above base-level standards for some islands protecting public benefits such as water quality, the ecosystem, life and personal property, agricultural production, cultural resources, recreation, and local and Statewide infrastructure. The scope of the Delta Levee Special Improvement Projects encompasses the Delta and levees bordering the northern Suisun Bay from Van Sickle Island to Montezuma Slough. Maintenance of upgraded levees will occur in conformance with specific criteria, consistent with meeting ERP objectives.

Delta Levee Subsidence Control Plan. The goal of this plan is to minimize the risk to levee integrity from land subsidence, in coordination with other CALFED Program elements. Measures will be implemented to reduce, eliminate, or reverse subsidence within a “zone of influence” (approximately 0-500 ft) adjacent to affected levees. Subsidence control techniques include:

- < Geotechnical engineering principles and practices in conjunction with proven construction methods.
- < Modifying seepage control, dewatering efforts, excavations, and land management activities near levees to best manage levee integrity.
- < Strategically locating and constructing stability and drainage berms.
- < Restricting practices such as land leveling, ditching, and certain other ground surface modifications within the zone of influence.
- < Promoting high ground water levels and vegetation growth, where appropriate, to limit subsidence due to oxidation.

Delta Levee Emergency Management and Response Plan. The goals of this plan are to enhance existing emergency management response capabilities in the Delta, and to develop a stable funding source for emergency response. Future planning will concentrate on improving funding, resources, and response by State and Federal agencies; integrating response by all levels of government; clarification of regulatory procedures; and improving dispute resolution procedures.

Delta Levee Risk Assessment and Risk Management Strategy. The goals of this strategy are to quantify the risks to Delta levees, evaluate the consequences, and develop an appropriate risk management strategy by the end of Stage 1.

Suisun Marsh Levee System Plan. The CALFED Program will evaluate whether to include the Suisun Marsh levee system in the Levee Integrity Plan, and, if included, what level of protection is appropriate. This plan will evaluate the appropriate level of protection for Suisun Marsh levees, evaluate the best method of protection, and implement the method during Stage 1. This plan may protect part of the levee system by rehabilitating and maintaining some levees to protect managed wetlands and develop new tidal wetlands. Implementation will incorporate ERP and MSCS actions, consistent with Service-approved recovery plans.

Proposed Levee System Integrity Program Stage 1 Actions

The CALFED Agencies will evaluate the following Levee System Integrity Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Levee System Integrity Program.

- < Initiate the Levee Program Coordination Group. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning, design, implementation, and management of levee projects (yr 1).
- < Obtain short-term Federal and State funding authority as a bridge between the existing Delta Flood Protection Authority (AB 360) and long-term levee funding (yr 1-5).
- < Obtain long-term Federal and State funding (yr 1-7).
- < Conduct project level environmental documentation and obtain appropriate permits for each action/group of actions (yr 1-7).
- < Implement demonstration projects for levee designs, construction techniques, sources of material, reuse of dredge material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e., construction) and long-term (i.e., maintenance and design) ecosystem benefits, and provide increased information (yr 1-7).
- < Adaptively coordinate Delta levee improvements with ecosystem improvements by

- incorporating successful techniques for restoring, enhancing, or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (yr 1-7).
- < Fund levee improvements up to PL 84-99 criteria in Stage 1; e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements (yr 1-7).
 - < Further improve levees which have significant Statewide benefits in Stage 1; e.g., State-wide benefits to water quality and highways (yr 1-7).
 - < Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements (yr 1-7).
 - < Enhance existing emergency response plans; e.g., establish a revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contacts for flood fighting and recovery operations, and outline environmental considerations during emergencies (yr 1-7).
 - < Implement current Best Management Practices (BMPs) to correct subsidence effects on levees. Assist CALFED Program's Science Program activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED Program objectives (yr 1-7).
 - < Develop BMPs for the reuse of dredge materials (yr 1).
 - < Institute a program for using Bay and Delta dredge material to repair Delta levees and restore Delta habitat (yr 1-7).
 - < Complete total risk assessment for Delta levees and develop and begin implementation of risk assessment options as appropriate to mitigate potential consequences (yr 1-7).
 - < Complete the evaluation of the best method for addressing the Suisun Marsh levee system (yr 1-2).

Water Quality Program

The CALFED Program's WQP will strive to create water quality conditions that fully support a healthy and diverse ecosystem and the multiplicity of human uses of water. The geographic scope of the WQP encompasses five regions: the legal Delta; the Bay Region which includes Suisun Bay and Marsh, San Pablo Bay, and the San Francisco Bay watershed; the Sacramento River Region, bounded by the ridge tops of the Sacramento River watershed or hydrologic region; the San Joaquin River Region which includes both the San Joaquin River and Tulare Lake hydrologic basins; and, SWP and CVP service areas outside the Central Valley.

The CALFED Program's Water Quality Technical Group has identified the following water quality parameters of concern to beneficial uses: mercury, selenium, trace metals (copper, cadmium, and zinc), pesticides (carbofuran, chlorodane, chlorpyrifos, DDT, diazinon, PCBs, and

toxaphene), drinking water disinfection by-product precursors (bromide and total organic carbon), dissolved oxygen and oxygen reducing substances, ammonia, salinity (total dissolved solids), temperature, turbidity and sedimentation, pathogens, nutrients (nitrogen and phosphorus), pH (alkalinity), chloride, boron, sodium absorption ratio, and toxicity of unknown origin. These parameters provide the focal points for developing and implementing the CALFED Program's water quality actions. The July 2000 Water Quality Program Plan, a technical appendix to the CALFED Program's Final Programmatic EIS/EIR, provides a full description of the WQP. Individual projects pursued under the WQP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under NCCPA and/or CESA and section 7 or section 10 of the ESA.

Water Quality Program Plan

The Water Quality Program, largely through its agency-stakeholder Water Quality Technical Group, has developed programmatic actions to address water quality parameters of concern and beneficial use impairments. Water quality impairments or problems and associated programmatic actions to treat these problems are described in the WQP Plan. The WQP Plan is organized by the following sections: low dissolved oxygen and oxygen depleting substances, drinking water, mercury, pesticides, organochlorine pesticides, salinity, selenium, trace metals, turbidity and sedimentation, toxicity of unknown origin, and a section on implementation strategy. The environmental water quality components, including proposed actions, were transferred to and are now administered under the ERP. However, to maintain consistency between the Draft Programmatic EIS and Final Programmatic EIS, CALFED Agencies have left the environmental components in the WQP Plan.

Proposed Water Quality Program Stage 1 Actions

The CALFED Agencies will evaluate the following water quality actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WQP Plan.

General Water Quality Actions

- < Prepare project level environmental documentation and permitting as needed (yr 1-7).
- < Coordinate with other CALFED Program elements to ensure that in-Delta actions maximize potential for Delta water quality improvements (yr 1-7).
- < Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).

Environmental Water Quality Actions

Conduct the following mercury evaluation and abatement work:

Cache Creek:

- < Risk appraisal and advisory for human health impacts of mercury (yr 1-5).
- < Support development and implementation of Total Maximum Daily Load (TMDL) for mercury (yr 1-7).
- < Determine bioaccumulation effects in creeks and the Delta (yr 1-4).
- < Source, transport, inventory, mapping and speciation of mercury (yr 1-7).
- < Information Management/Public Outreach (yr 5-7).
- < Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate (yr 3-5).
- < Investigate sources of high levels of bioavailable mercury (yr 4-7).

Sacramento River:

- < Investigate sources of high levels of bioavailable mercury; inventory, map, and refine other models (yr 3-7).
- < Participate in remedial activities (yr 7).

Delta:

- < Research methylation (part of bioaccumulation) process in Delta (yr 1-2).
- < Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 3-7).
- < Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 3-5).

Conduct the following pesticide work:

- < Develop diazinon and chlorpyrifos hazard assessment criteria with the DFG and the Department of Pesticide Regulations (yr 1).
- < Support development and implementation of a TMDL for diazinon (yr 1-7).
- < Develop BMPs for dormant spray and household uses (yr 1-3).
- < Study the ecological significance of pesticide discharges (yr-1-3).
- < Support implementation of BMPs (yr 2-7).
- < Monitor to determine effectiveness (yr 4-7).

Conduct the following trace metals work:

- < Determine spatial and temporal extent of metal pollution (yr 3-7).
- < Determine ecological significance and extent of copper contamination (yr 1-3).
- < Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).

- < Participate in Brake Pad Partnership to reduce introduction of copper (yr 1-7).
- < Partner with municipalities on evaluation and implementation of stormwater control facilities (yr 2-5).
- < Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (yr 2-7).

Conduct the following selenium work:

- < Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
- < Evaluate and, if appropriate, implement real-time management of selenium discharges (yr 1-7).
- < Expand and implement source control, treatment, and reuse programs (yr 1-7).
- < Coordinate with other programs (yr 1-7); e.g., recommendations of San Joaquin Valley Drainage Implementation Program, and CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways.

Conduct the following sediment reduction work/organochlorine pesticides:

- < Participate in implementation of the United States Department of Agriculture (USDA) sediment reduction program (yr 1-7).
- < Promote sediment reduction in construction areas and urban stormwater, and other specific sites (yr 1-7).
- < Implement stream restoration and revegetation work (yr 4-7).
- < Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
- < Coordinate with ERP on sediment needs (yr 1-3).

Conduct the following work addressing dissolved oxygen (DO) and oxygen depleting substances (including nutrients):

- < Complete studies of causes for DO sag in San Joaquin River near Stockton (yr 1-2).
- < Define and implement corrective measures for DO sag (yr 1-7).
- < Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
- < Develop inter-substrate DO testing in conjunction with the ERP (yr 2-4).
- < Study nutrient effects on beneficial uses (yr 4-7).
- < Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations (yr 1-7).
- < Support finalizing investigation of methods to reduce constituents that cause low DO for inclusion in TMDL recommendation by the Central Valley Regional Water Quality Control Board (yr 2).

- < Support finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River (yr 2).
- < Support implementation of appropriate source and other controls as recommended in the TMDL (yr 3).
- < Participate in identifying unknown toxicity and addressing as appropriate (yr 1-7).

Drinking Water Quality Actions

Actions specific to drinking water improvements:

- < Work with Bay Area water suppliers as they develop a Bay Area Blending/ Exchange Project (yr 1-7).
- < Address drainage problems in the San Joaquin Valley to improve downstream water quality (yr 1-7).
- < Implement source controls in the Delta and its tributaries (yr 1-7).
- < Support ongoing efforts of the Delta Drinking Water Quality Council (yr 1-7).
- < Invest in treatment technology demonstrations (yr 1-7).
- < Control runoff into the California Aqueduct and other similar conveyances (yr 1-7+).
- < Address water quality problems at the North Bay Aqueduct (yr 1-7).
- < Conduct comprehensive evaluations, pilot programs, and full scale actions to reduce Total Organic Carbon (TOC) contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvements (yr 1-7).
- < Improve DO concentrations in the San Joaquin River near Stockton (yr 1-3).
- < Study recirculation of export water to reduce salinity and improve DO in the San Joaquin River. If feasible, and consistent with ERP goals and objectives, implement a pilot program (yr 1-4).

Ecosystem Restoration Program

The Ecosystem Restoration Program (ERP) will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta estuary and its watershed to support sustainable populations of diverse plant and animal species. All CALFED Program elements will contribute in varying degrees to this goal, with the ERP being the principal CALFED Program element designed to restore the ecological health of the Bay-Delta system. The ERP includes actions throughout the Bay-Delta watershed, focusing on the restoration of ecological processes and important habitats. The CALFED Program proposes to improve ecosystem quality for the Bay-Delta system in order to reduce conflicts among beneficial uses of California's water. Individual projects pursued under the ERP will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under NCCPA and/or CESA and under section 7 or section 10 of the ESA.

The primary geographic focus area of the ERP is the Sacramento-San Joaquin Delta, Suisun and San Pablo Bay, the Sacramento River below Shasta Dam, the San Joaquin River below the confluence with the Merced River, and their major tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. This primary geographic focus area is divided into 14 ecological management zones (discussed in Ecosystem Restoration Program Plan Volume II). The secondary geographic focus area is the upper watersheds surrounding the primary focus area and Central and South San Francisco Bay and their local watersheds.

Success of the CALFED Program hinges upon the full and successful funding and implementation of the ERP, MSCS, other existing and tiered biological opinions, as well as other environmental commitments. Although it is anticipated that some ERP actions will be refined or altered, based upon new information and adaptive management, the successful implementation of nearly all actions is necessary to achieve the species recovery goals identified in the ERP. The ERP is not designed as mitigation for projects to improve water supply reliability or to bolster the integrity of Delta levees. Instead, improving ecological processes and increasing the amount and quality of habitat are co-equal with other CALFED Program goals related to water supply reliability, water quality, and levee system integrity.

The ERP is comprised of a Strategic Plan and a two-volume restoration plan: Volume I which describes the ecosystem elements or attributes (ecological processes, habitats, species and species groups, and anthropogenic stressors) the program addresses; and, Volume II which presents the ecological management zones and proposed programmatic actions.

Ecosystem Restoration Program Strategic Plan and Goals

The ERP Strategic Plan contains the following goals and objectives:

- < Goal 1: Achieve recovery of at-risk native species dependent on the Delta and Suisun Bay as the first step toward establishing large, self-sustaining populations of these species; support similar recovery of at-risk native species in San Francisco Bay and the watershed above the estuary; and minimize the need for future endangered species listings by reversing downward population trends of native species that are not listed.
- < Goal 2: Rehabilitate natural processes in the Bay-Delta estuary and its watershed to fully support, with minimal ongoing human intervention, natural aquatic and associated terrestrial biotic communities and habitats, in ways that favor native members of those communities.
- < Goal 3: Maintain and/or enhance populations of selected species for sustainable commercial and recreational harvest, consistent with the other ERP goals.
- < Goal 4: Protect and/or restore functional habitat types in the Bay-Delta estuary and its watershed for ecological and public values such as supporting species and biotic communities, ecological processes, recreation, scientific research, and aesthetics.

- < Goal 5: Prevent the establishment of additional non-native invasive species and reduce the negative ecological and economic impacts of established non-native species in the Bay-Delta estuary and its watershed.
- < Goal 6: Improve and/or maintain water and sediment quality conditions that fully support healthy and diverse aquatic ecosystems in the Bay-Delta estuary and watershed; and eliminate, to the extent possible, toxic impacts to aquatic organisms, wildlife, and people.

There are several objectives under each goal. ERP goals and objectives are integrated with those of the CALFED Program's MSCS, WQP, and Nonnative Invasive Species Strategic Plan.

The ERP Strategic Plan also presents and describes:

- < An ecosystem based management approach for restoring and managing the Bay-Delta ecosystem.
- < An adaptive management process that is sufficiently flexible and iterative to respond to changing Bay-Delta conditions and to incorporate new information about ecosystem structure and function.
- < The value and application of conceptual models in developing restoration actions and defining information needs, with examples of their development and use.
- < Institutional and administrative considerations necessary to implement adaptive management, to ensure scientific credibility of the restoration program and to engage the public in the restoration program.
- < Decision rules and criteria to help guide the selection and prioritization of restoration actions.
- < Opportunities and constraints to be considered in developing a restoration program.

Ecosystem Restoration Program Plan

The Ecosystem Restoration Program Plan (ERPP) is composed of two volumes. Volume I presents the elements or components of the ERP. These "ecosystem elements" are organized into four categories: ecological processes (e.g., central valley stream flows, Bay-Delta hydrodynamics, bay-delta aquatic foodweb); habitats (e.g., tidal perennial aquatic, saline emergent wetland, riparian and riverine aquatic); species and species groups (species designated for recovery, species designated for contribute to recovery, species assemblages designated for enhance and/or conserve biotic communities, harvested species to be maintained and/or enhanced); and, stressors (e.g., water diversions, nonnative invasive species, contaminants, gravel mining). Consult ERPP Volume I for the complete list and description of ERP ecosystem elements (total of 106 elements).

ERPP Volume II identifies over 600 programmatic actions to be implemented throughout the Bay-Delta estuary and its watershed over the 30-year period of the CALFED Program. Volume

II also gives targets for the ecosystem elements (e.g., acres of tidal fresh emergent wetland to be restored). Volume II is organized by Ecological Management Zones. The primary ERP geographic focus area is divided into 14 Ecological Management Zones: Sacramento-San Joaquin Delta, Suisun Marsh/North San Francisco Bay, Sacramento River, North Sacramento Valley, Cottonwood Creek, Colusa Basin, Butte Basin, Feather River/Sutter Basin, American River Basin, Yolo Basin, Eastside Delta Tributaries, San Joaquin River, East San Joaquin, and West San Joaquin. Each zone is further divided into Ecological Management Units. Under each Ecological Management Zone are the ecosystem elements and associated proposed programmatic actions and restoration targets that the ERP will address in that zone. There is also a section in Volume II that gives ERP targets, MSCS species goal prescriptions, and MSCS conservation measures for species and species groups ecosystem elements.

Proposed Ecosystem Restoration Program Stage 1 Actions

CALFED Agencies will evaluate the following ERP actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the ERP:

- < Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning design, implementation, and management of ecosystem restoration projects (yr 1-7).
- < Conduct project level environmental documentation and permitting as needed for each bundle of Stage 1 actions (yr 1-7).
- < Fully coordinate with other ongoing activities which address ecosystem restoration in the Bay-Delta system; e.g., CVPIA, Four Pumps Agreement, Non-native Invasive Species Task Force (yr 1-7).
- < Implement habitat restoration in the Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function and facilitate recovery of endangered species consistent with the goals of the ERP Strategic Plan and MSCS. Habitat restoration efforts in Stage 1 will: restore 2,000 acres of tidal perennial aquatic habitat; restore 200 acres of deep open water nontidal perennial aquatic habitat; restore 300 acres of shallow open water nontidal perennial aquatic habitat; enhance and restore 50 miles of Delta slough habitat; enhance and restore 50 to 200 acres of midchannel islands; restore 8,000 to 12,000 acres of fresh emergent (tidal) wetlands; restore 4,000 acres of fresh emergent (non-tidal) wetlands; restore 25 miles of riparian and riverine aquatic habitat; restore 1,000 to 2,000 acres of perennial grassland; and establish 8,000 to 12,000 acres of wildlife-friendly agricultural habitat. These actions represent approximately one-fourth of the acreage identified in the ERP to be restored during the 30-year implementation period (yr 1-7).

- < Implement large-scale restoration projects on select streams and rivers (e.g., Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in later stages (yr 1-7).
- < Implement an EWA that acquires water for ecosystem and species recovery needs, substantially through voluntary purchases in the water transfer market in its first few years and developing additional assets over time (yr 1-7).
- < Pursue full implementation of ERP upstream flow targets, over and above EWA assets and regulatory actions, through voluntary purchases of at least 100,000 acre-feet of water by the end of Stage 1. Evaluate how the ERP water acquisitions and EWA water acquisitions will be integrated most effectively (yr 1-7).
- < Complete targeted research and scientific evaluations needed to resolve the high priority issues and the uncertainties identified in the ERP Strategic Plan (e.g., instream flow, non-native organisms, and Bay-Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in later stages (yr 1-7).
- < Establish partnerships with universities for focused research (yr 1-7).
- < Acquire floodplain easements, consistent with ecosystem and flood control needs along the Sacramento and San Joaquin Rivers (yr 4-7).
- < Continue high priority actions that reduce direct mortality to fishes (yr 1-7):
 - < Screen existing unscreened or poorly screened diversions in the Delta, on the Sacramento River, San Joaquin River, and tributary streams based on a systematic priority approach.
 - < Remove select physical barriers to fish passage.
- < Continue gravel management, e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries. Most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites (yr 1-7).
- < Develop and begin implementing a CALFED Program comprehensive non-native (exotic) invasive species prevention, control, and eradication plan including the following (yr 1-7):
 - < Implement invasive plant management program in Cache Creek.
 - < Develop ballast water management program.
 - < Develop early-response invasive organism control programs.
 - < Evaluate CALFED Program implementation actions and how those actions may benefit non-native species to the detriment of native species or the Bay-Delta ecosystem.
- < Provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above, e.g., pursue actions that are opportunity-

- based (willing sellers, funding, permitting), provide incremental improvements on private land through incentives, and develop partnerships with farmers on “environmentally friendly” agricultural practices (yr 1-7).
- < Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
 - < Evaluate the feasibility of harvest management to protect weaker fish stocks (yr 1-7).
 - < Implement projects on selected streams to provide additional upstream fishery habitat by removing or modifying barriers (yr 1-7).
 - < Assist in the preparation of detailed, ecosystem-based restoration and recovery plans for any priority species identified in the ERP Strategic Plan and the MSCS for which up-to-date plans are not available. Begin implementing appropriate additional restoration actions identified in these plans (yr 1-7).
 - < Identify and advance specific regional ERP goals (yr 1-7).

Additional draft ERP Stage 1 actions are presented by Ecological Management Zone in Appendix D of the ERP Strategic Plan.

Water Use Efficiency Program

The Water Use Efficiency Program (WUE) relies on a combination of technical assistance, incentives, and directed studies for the four WUE program elements: Agricultural Water Conservation, Urban Water Conservation, Water Recycling, and Managed Wetlands.

Technical assistance programs and directed studies will begin for all four elements. Incentive programs will be designed to award CALFED Program grant funding for projects that demonstrate potential to provide the CALFED Program water supply reliability, water quality, or ecosystem restoration benefits.

The WUE Program includes water conservation and water recycling actions to facilitate efficient use of water at the regional and local level. Individual projects pursued under the WUE will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under NCCPA and/or CESA and section 7 or section 10 of the ESA. The programmatic water use efficiency actions include the following:

Water Conservation Related Actions

- < Work with the California Urban Water Conservation Council and the Agricultural Water Management Council (AWMC) to identify appropriate urban and agricultural water conservation measures, set appropriate levels of effort, and, in the case of the urban effort,

- identify a proper entity and process to certify or endorse water suppliers that are implementing cost-effective feasible measures.
- < Expand State and Federal programs to provide sharply increased levels of planning, technical, and financing assistance and develop new ways of providing assistance in the most effective manner.
 - < Assist urban water suppliers comply with the Urban Water Management Planning Act.
 - < Assist water suppliers and water users to identify and implement water management measures that can yield multiple benefits, including improved water quality and reduced ecosystem impacts.
 - < Identify and implement practices to improve water management on managed wetlands.
 - < Gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices.
 - < Identify, in region-specific Strategic Plans for Agricultural Areas, quantifiable objectives to assure improvements in water management.

Water Recycling Actions

- < Assist local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act.
- < Expand State and Federal recycling programs in order to provide increased levels of planning, technical, and financing assistance (both loans and grants), and develop new ways of providing assistance in the most effective manner.
- < Provide regional planning assistance that can increase opportunities for use of recycled water.

Proposed Water Use Efficiency Stage 1 Actions

CALFED Agencies will evaluate the following WUE actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the WUE Program.

- < Expand existing State and Federal agricultural Water Conservation Programs to support on farm and district efforts. Expand State and Federal programs to provide technical and planning assistance to local agencies and districts in support of local and regional conservation and recycling programs (yr 1-7).
- < Expand existing State and Federal conservation programs to support urban water purveyor efforts. Expand State and Federal programs to provide technical and planning assistance in support of conservation and recycling programs (yr 1-7).
- < Utilize AB 3616 of the Agricultural Water Management Council to evaluate and endorse Agricultural Water Management Plans to implement cost-effective water management

- practices by agricultural districts. Identify and secure ongoing funding sources for Agricultural Water Management Council and its members seeking to actively participate in the development, review, and implementation of these plans (yr 1-7).
- < Develop Urban Water Management Plan Certification Process - Select an agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, and implement program (yr 1-3).
 - < Implement Urban BMPs Certification Process. Implement a process for certification of water suppliers' compliance with terms of the Urban Memorandum of Understanding (MOU) with respect to BMPs analysis and implementation for urban water conservation. Provide funding support for the California Urban Water Conservation Council (CUWCC) to carry out this function (yr 1-7).
 - < Prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED Program governance structure, for a competitive grant/loan incentive program for WUE (yr 1). This will include:
 - < Incentives in the agricultural sector that will consider several factors, including: (i) potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUE measures which result in reduced diversions; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the recipient area experiences recurrent water shortages due to regulatory or hydrological restrictions. Many of these factors are included in the Quantifiable Objectives for Agricultural Water Use Efficiency, and as such, the Quantifiable Objectives will be an important component of the agricultural incentive criteria.
 - < Incentives in the urban sector will assist in identifying and implementing urban water conservation measures that are supplemental to BMPs in the Urban MOU process and are cost effective from a Statewide perspective.
 - < Incentives for water recycling in the urban and agricultural areas.
 - < Annual reporting and evaluation mechanisms to gauge effectiveness of the program.
 - Finalize and implement the methodology for Refuge Water Management which was described in the June 1998 "Interagency Coordinated Program for Wetland Water Use Plan, Central Valley, California" (yr 1-3).
 - Research effort to establish appropriate reference conditions for evaluating program progress, and to identify improved methods for WUE (yr 1-7).
 - Assess the need for additional water rights protections. Evaluate the need for additional State regulations or legislation providing protection for water right holders who have implemented WUE measures and subsequently transferred water to other beneficial uses (yr 1-4).
 - Water Management. Develop State legislation that requires appropriate measurement of water use for all water users in California (yr 1-3).

- Create a Public Advisory Committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate State, Federal, regional and local efforts for maximum effectiveness of program expenditures (yr 1).

Water Transfer Program

The CALFED Program's Water Transfer Program (WTP) will encourage the development of a more effective water transfer market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests. CALFED Agencies have legal and regulatory responsibility for review and approval of most water transfers and also have jurisdiction over many of the storage and conveyance facilities required to make water transfers work. These agencies are in a position to improve or facilitate the operations of the water market by adopting policies and implementing programs that will allow transfers to be completed efficiently while protecting the environment. The Strategic Plan for Implementation provides direction and prioritization for implementation of the CALFED Program's Water Transfer Program, and includes the following actions:

Interactive California Water Market Information Web Site

- < Develop the On Tap on-line water market information source for California water transfers.

Environmental, Socio-economic, and Water Resource Protection

- < Recommend establishment of a California Water Transfers Information Clearinghouse to ensure that decisions regarding proposed water transfers can be made with all parties in possession of complete and accurate information and to facilitate assessment of potential third party impacts.
- < Require additional water transfer analysis regarding direct and indirect impacts. The DWR, Reclamation, and the State Water Resources Control Board (SWRCB) will require transfer proponents to provide analysis of the direct and indirect impacts of a proposed transfer, in addition to CEQA, ESA compliance or other environmental requirements.
- < Develop improved tracking protocols to ensure that water transferred to an instream flow can be tracked and then delivered to the intended destination.
- < Work with stakeholders and the State Legislature to assist local agencies in development of groundwater management programs to protect groundwater basins in water transfer source areas.

Technical, Operational, and Administrative Rules

- < Work to streamline the current water transfer approval processes through development of new tools, clarification of existing policies, refinement of processes and addition of staff and resources.
- < Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions.
- < Work with stakeholder representatives to resolve conflicts over carriage water criteria.
- < Work with stakeholder representatives to develop criteria that protect other legal users of water from injury as a result of refill of a reservoir after the transfer of stored water.

Wheeling and Access to State/Federal Facilities

- < Improve forecasting tools and more widely disclose potential pumping and conveyance capacity in project facilities, including limiting factors and inherent risks.
- < Work with stakeholder representatives to consider modification of policies and procedures for transporting non-project water through existing project water conveyance facilities.
- < Work with stakeholder representatives to develop cost criteria associated with transporting transferred water through State or Federal conveyance facilities.

Proposed Water Transfer Program Stage 1 Actions

CALFED Agencies will evaluate the following actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Water Transfer Program.

- < Develop an Interactive Water Transfer Information Web-site. CALFED Agencies will develop, implement, and maintain an interactive, publicly available web-site called On TAP (by the end of year 2000) (yr 1).
- < Establish the California Water Transfers Information Clearinghouse to operate and maintain the On Tap web-site, collect and disseminate data and information relating to water transfers and potential transfer impacts, and perform research using historic data to understand water transfer impacts (by year 2001) (yr 1).
- < Coordinate with CALFED Agencies to require water transfer applicants to provide additional impact assessment information (yr 1-4).
- < Identify, arrange, fund, and carry out a specific number of targeted water transfers for in-stream environmental purposes as part of the ERP, with a goal of using these transfers to evaluate the effectiveness of and make any necessary improvements to the California Water Code Section 1707 procedures and tracking protocols (yr 1-3).

- < Establish a groundwater assistance program to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs (yr 1-2).
- < Develop a streamlined water transfer approval process including “pre-certification” of certain classes of transfers and expedited environmental review procedures (yr 1-6).
- < Work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions (yr 1-3).
- < Continue to work with stakeholder representatives to resolve conflicts over carriage water criteria (yr 1-3).
- < Establish a refill criteria policy for reservoir storage based water transfers (yr 1).
- < Begin forecast and disclosure processes of potential conveyance capacity in existing export facilities (Reclamation and DWR). This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1-7).
- < Work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).

Watershed Program

The Watershed Program will use a comprehensive, integrated, basin-wide approach with a goal to improve conditions in the Bay-Delta system. This Watershed Program will emphasize local participation and provide financial and technical assistance for local watershed stewardship, and promote coordination and collaboration among watershed efforts.

The geographic scope of the Watershed Program encompasses the entire scope of the CALFED Program. The Watershed Program will support activities that provide benefits to the Delta, Suisun Bay, and Suisun Marsh.

The Watershed Program covers a broad geographic range and currently lacks project-specific measures for evaluation. Individual projects pursued under the Watershed Program will fully evaluate all alternatives during tiered environmental review and will fully analyze and address effects under NCCPA and/or CESA and section 7 or section 10 of the ESA. CALFED will ensure that appropriate measures to conserve special status species are included in all program actions.

There are five Watershed Program elements: coordination and assistance; adaptive management and monitoring; education and outreach; integration with other CALFED Program elements; and watershed processes and relationships. These elements, associated proposed programmatic actions, and an implementation strategy are described in the Watershed Program Plan.

The primary objectives of the Watershed Program are:

- < Facilitate and improve coordination, collaboration, and assistance among government agencies, other organizations, and local watershed groups.
- < Develop watershed monitoring and assessment protocols.
- < Support education and outreach.
- < Integrate the Watershed Program with other CALFED Program elements.
- < Define the relationship between watershed processes and the goals and objectives of the CALFED Program.
- < Implement a strategy that will ensure support and long term sustainability of local watershed activities.

Watershed activities will be supported that:

- < are community based
- < are collaborative and are consistent with the CALFED Program
- < address multiple watershed issues
- < are coordinated with and supported at multiple levels
- < provide ongoing implementation
- < include monitoring protocols
- < increase learning and awareness.

Proposed Watershed Program Stage 1 Actions

The CALFED Program will evaluate the following Watershed Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Watershed Program Plan.

- < Fund and implement community based watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Program (yr 1-7).
- < Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation among government agencies and stakeholder groups (yr 1-7).
- < Implement a funding process and provide watershed stewardship funds to build the capacity of locally controlled watershed groups that ensure participation of local landowner groups (yr 1-7).
- < Improve the use and usefulness of existing or future watershed information management

- functions to provide data and other information to people involved in watershed management (yr 3-7).
- < Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (yr 1-7).
 - < Evaluate the benefits that accrue from watershed plans and projects designed to achieve CALFED Program goals and objectives (yr 3-7).
 - < Establish, fund, and maintain watershed restoration and maintenance assistance to aid local watershed groups and private landowners in project concept, design, and implementation (yr 1-7).
 - < Collaborate with other CALFED Program and non-CALFED Program elements on watershed related activities (yr 1-7).
 - < Provide appropriate information and assistance to stakeholders and the State Legislature to develop a Statewide umbrella Watershed Management Act (yr 1).

Water Management Strategy (WMS)

The Water Management Strategy (WMS) describes a framework to coordinate and integrate the water management tools in the program, evaluate the success of implementation efforts, and select additional tools needed to achieve the CALFED Program's water reliability objectives. The CALFED Program has identified three primary goals for the WMS: increase the utility of available water supplies (making water suitable for more uses and reuses); improve access to existing or new water supplies in an economically efficient manner, for environmental, urban and agricultural beneficial uses; and, improve flexibility of managing water supply and demand in order to reduce conflicts between beneficial uses and decrease system vulnerability.

The tools that will be used to achieve the goals and objectives of the WMS include: the WUE Program (agricultural, urban, and wetland water conservation and water recycling); the Water Transfer Program; Conveyance, including South Delta Improvements; Storage; and, operational strategies, such as real-time diversion management and an EWA. In addition to these primary tools, the WMS will rely on additional CALFED Program tools to provide additional benefits. These include the Watershed Program, the Water Quality Program, and real-time monitoring through the Science Program.

Storage

The CALFED Program has initiated the Integrated Storage Investigation (ISI) to provide a comprehensive assessment of alternative surface and groundwater storage options and their utility to overall water management.

Decisions to implement new or expanded surface and groundwater storage will be predicated

upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual storage projects pursued under the WMS will fully evaluate project-level alternatives that are consistent with the decision documents in selecting the least environmentally damaging practicable alternative at the time of the permit decision unless new information is submitted at the time of the Section 404 permit process indication that the programmatic level information is incorrect or incomplete in some material manner. The level of analysis is conditioned on the programs and related commitments of the CALFED Program, including those related to water use efficiency, water transfers, and the ERP, being implemented. Direct and indirect effects will be addressed under NCCPA and/or CESA and section 7 or section 10 of the ESA.

Site-specific studies of storage opportunities will be coordinated under the ISI. Specifically, the ISI will evaluate surface storage, groundwater storage, power facility re-operation, and removal of barriers to fish passage and, where appropriate, the potential for conjunctive operation of these different types of storage. These investigations will contribute to compliance with the requirements, within the Clean Water Act Section 404 Guidelines, to select the least environmentally damaging practicable alternative to improving storage.

The range of total new storage evaluated in Phase II was from zero up to about six Million acre- feet (MAF). Maximum Sacramento River off-stream or enlarged on-stream surface storage potential is estimated to be about three MAF of storage, while south of Delta off-aqueduct surface storage potential is estimated to be about two MAF of storage. Other types of surface storage considered in Phase II include San Joaquin River tributary storage and in-Delta storage. The CALFED Program will evaluate the feasibility of expanding two existing reservoirs and constructing a new off-stream reservoir with a total capacity of 950 thousand-acre-feet (TAF); and a major expansion of groundwater storage for an additional 500 TAF to one MAF. In addition, the CALFED Program will study two potential reservoir locations through partnerships with local agencies.

The CALFED Program will continue to evaluate surface and groundwater storage opportunities; initiate permitting; NEPA and CEQA documentation; and proceed with construction, only if all conditions are satisfied. In addition, the CALFED Program will continue to refine and periodically update the WMS. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability, and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Evaluation Framework will include: 1) a comprehensive hierarchy of objectives for the CALFED Program; 2) well-defined measures of performance associated with the achievement of objectives; and 3) a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a

structure for periodically updating the WMS and determining appropriate levels of the future investment in various water management tools.

Proposed Stage 1 Storage Actions

The CALFED Program will evaluate the following Storage actions proposed for implementation during Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Storage Program. Each will require project-specific consultation under NCCPA and/or CESA and section 7 of the ESA prior to authorization and construction.

Groundwater Banking and Conjunctive Use

The goal is to develop locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to one MAF of additional storage. This effort includes developing partnerships with local agencies and landowners in both the north-of-Delta and south-of-Delta areas, and includes the potential construction of several south-of-Delta projects. Additional south-of-Delta and north-of-Delta projects, if feasible, could be constructed in later stages.

- < Finalize agreements with new local project proponents for joint planning and development (yr 1).
- < Begin feasibility studies (yr 1).
- < Report on the performance of feasibility studies, implemented projects, and potential benefits and beneficiaries (yr 3).
- < Implement early stages of the most promising projects (yr 1-5).
- < Pursue implementation of additional projects (yr 1-7).
- < Support legislation that supports groundwater management by local agencies at the sub-basin level.

Surface Storage

CALFED Agencies identified a list of twelve potential surface storage projects that are in varying stages of the environmental review or feasibility process. Actions taken in Stage 1 will focus on completing the necessary studies (technical work and environmental reviews) needed before implementing or proceeding with the six surface storage projects:

- < In-Delta storage project (approximately 250 TAF). CALFED will evaluate leasing or purchasing the Delta Wetlands project, and will evaluate initiating a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible (Planning: yr 1-2, Construction: yr 3-7).

- < Evaluate expanding CVP storage in Shasta Lake by approximately 300 TAF by raising the Shasta Dam by three to six feet (Planning: yr 1-4, Construction yr 2004).
- < Evaluate expanding Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros Reservoir is subject to a number of mandates, agreements, and requirements in existing biological opinions. CALFED intends to work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are maintained (yr 1-7).
- < Evaluate off-stream storage at Sites Reservoir, with a project capacity of up to 1.9 MAF (yr 1-5).
- < Evaluate additional storage options in the upper San Joaquin River watershed. Consider additional storage capacity of between 250-700 TAF (yr 1-6).
- < Evaluate enlarging Millerton Lake at Friant Dam or a functionally equivalent storage program in the region. The CALFED Program will join local partners to evaluate this project in Stage 1 (yr 1-6).

Power Facilities Re-operation Evaluation

Evaluate the potential to re-operate some hydroelectric facilities to produce ecosystem benefits and water supply. The following ISI actions may be taken:

- < Identify beneficiaries and negotiate cost sharing agreements (yr 1-7).
- < Work with CALFED Agencies, the Public Utilities Commission, the SWRCB, the Federal Energy Regulatory Commission, and interested stakeholders to identify re-operation opportunities (yr 1-2).
- < Develop environmental documentation on re-operation (yr 3-5).
- < Perform feasibility studies and economic analyses (yr 3-5).
- < Obtain permits, negotiate operating agreements, and seek site specific authorization including section 7 authorization. This may require design of facilities modifications to accommodate new operational priorities (yr 5-7).

Fish Migration Barrier Removal Evaluations

As part of the ERP some obstructions to fish passage, such as small dams, are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. ISI actions also include the role of barrier removal. The following actions will be taken:

- < Work with CALFED Agencies, the SWRCB, local water agencies, and interested

- stakeholders to identify opportunities for modification or removal of obstructions such as small dams (yr 1-2).
- < Develop environmental documentation (yr 3-5).
 - < Perform feasibility studies and economic analyses (yr 3-5).
 - < Obtain permits, negotiate agreements, and seek site specific authorization as required. This may require design on facilities modifications or removal actions. (yr 5-7).
 - < Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
 - < Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Conveyance

The CALFED Program will evaluate a through-Delta approach to conveyance based upon the existing Delta configuration with some modifications. The CALFED Program will evaluate the effectiveness of this conveyance approach, and add additional conveyance and/or other water management actions if necessary. The initial through-Delta conveyance will be continually monitored, analyzed, and improved to maximize the potential of the through-Delta approach to meet CALFED Program goals and objectives, consistent with the CALFED Program's Solution Principles. In the event of a finding that a through-Delta conveyance system is inadequate to achieve CALFED Program goals and objectives, additional actions may be implemented. The CALFED Program may also evaluate and pursue: 1) an isolated conveyance facility (a canal connecting the Sacramento River in the northern Delta to the SWP and CVP export facilities in the southern Delta); 2) source water blending or substitution; and/or 3) other actions through supplemental programmatic analysis.

As part of the Conveyance Program, the CALFED Program has incorporated the south Delta and north Delta regions to address conveyance improvements and related problems in Stage 1. Conveyance improvements for the South Delta set forth in the Final Programmatic EIR/EIS are identified as allowing SWP export capacity to increase from the current authorized levels with seasonal increases, as authorized in Corps Permit PN5820A. The proposed increases would allow up to 8,500 cfs pumping in 2003 and ultimately up to 10,300 cfs at the end of Stage 1. The EIR/EIS identifies a number of measures that will be part of the conveyance modifications including new fish screens, ecosystem restoration as part of the ERP, permanent operable barriers or their functional equivalent in selected South Delta channels, and other measures.

Improvements in export capabilities will be accompanied by associated operations which will maintain diversion capabilities for south Delta water users and provide for fish protection. CALFED implementing documents set forth a schedule for securing appropriate regulatory permits and completing a project-specific operations plan that addresses the potential impacts of increased pumping. This plan will need to reflect the nature and timing of the construction and operation of

new project facilities and implementation of ecosystem improvements, and a more specific project description following completion of additional planning and environmental studies.

Decisions to implement conveyance actions will be predicated upon completing site-specific feasibility studies and complying with all environmental review and permitting requirements. Individual conveyance projects pursued under the WMS will fully evaluate all alternatives during tiered environmental review and will fully analyze and address direct and indirect effects under NCCPA and/or CESA and section 7 or section 10 of the ESA. Operational rules and facilities needed for use of additional export capability will be determined during ESA consultation on the project-specific environmental documentation prepared for the various conveyance elements.

Proposed Conveyance Stage 1 Actions (South Delta)

The CALFED Program will evaluate the following Conveyance actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions in the Conveyance Program.

- < Pursue construction and evaluation of a 500 cfs test facility at the Tracy Pumping Plant to develop best available fish screening and salvage technology for the intakes to the SWP and CVP export facilities (yr 1-7).
- < Pursue authorization for construction of a new screened intake for Clifton Court Forebay for the full export capacity of the SWP (yr 1-7).
- < Implement the Joint Point of Diversion for the SWP and CVP (yr 1-7).
- < Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. An intertie between Clifton Court Forebay and the Tracy Pumping Plant will be required if the export location is consolidated at Clifton Court Forebay and will be evaluated if exports continue at both locations. Also, evaluate and potentially implement an intertie between the projects downstream of the export pumps (yr 1-7).
- < Evaluate increased SWP pumping by 500 cfs from July through September (yr 1-4).
- < Facilitate interim SWP export flexibility up to 8,500 cfs, with appropriate environmental constraints including ESA requirements (yr 4).
- < Obtain permits including ESA authorization to use full SWP capacity of 10,300 cfs, consistent with all applicable operational constraints, for water supply and environmental benefits (yr 7).
- < For purposes of the project level environmental analysis for the South Delta Improvements, evaluate various operable barrier configuration alternatives or their functional equivalents. All barrier operations will be done in conjunction with water operations to avoid impacts to fish. Potential barriers include the installation of a permanent fish migration barrier at the Head of Old River, and the construction of three permanent flow control structures at Old River at Tracy, Middle River upstream of Victoria Canal, and at Grant Line Canal. The

- Grant Line Canal barrier would be constructed and operated in accordance with conditions and directions specified by the Service, DFG, and NMFS. (yr 1-7).
- < Monitor barrier effects on fish, stages, circulation, and water quality (yr 1-7).
 - < Evaluate the dredging of selected channel segments (yr 3-7).

Additional Actions Required During Stage 1 (South Delta)

- < Implement south Delta ERP goals (yr 1-7).
- < Consolidate, extend, and screen local agricultural diversions based on priority and initiate a screen maintenance program (yr 1-7).
- < Develop a strategy to resolve regional water quality problems including actions to improve San Joaquin River DO conditions and the San Joaquin River drainage as describe in the CALFED Program's Water Quality Program. Evaluate the feasibility of re-circulation of water pumped from the Delta by the CVP and SWP. If feasible, and consistent with the CALFED Program's ecosystem restoration goals and objectives, implement a pilot program (yr 1-7).
- Continue implementation of the Vernalis Adaptive Management Plan. Include development of a long-term plan describing actions of the San Joaquin River Group Authority to improve water management practices (yr 1-7).

Proposed North Delta Stage 1 Actions

- < Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns (yr 1-4).
- < Evaluate a screened through-Delta facility with a diversion capacity of up to 4,000 cfs on the Sacramento River. This evaluation would consider the effectiveness of water quality measures and how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery. If the environmental review demonstrates that this diversion facility is needed to improve water quality in the Delta and at the export facilities, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction may begin late in Stage 1 subject to NCCPA and/or CESA and section 7 authorization (yr 1-4).
- < Evaluate opportunities to resolve local flood concerns and create tidal wetlands and riparian habitat by constructing new setback levees, improving existing levees, and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system. Any proposed channel modifications would be consistent with the CALFED Program's current direction on Delta conveyance and ecosystem goals (yr 1-7).
- < Facilitate regionwide coordination of all CALFED Program related projects in the north Delta region (yr 1-7).

Proposed Stage 1 Actions Throughout the Delta Region

- < Evaluate how water supplies can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and three parts per million (ppm) TOC (yr 1-7). This will include an equivalent level of investigation and studies on all of the actions which could be used to achieve the CALFED Program's targets.
- < Evaluate the CALFED Program's progress toward measurable water quality goals and ecosystem restoration objectives, with particular emphasis on fish recovery (yr 6-7).
- < Conduct additional environmental review to determine if construction of an isolated conveyance facility component of a dual Delta conveyance (presently not an element of the CALFED Program's Preferred Program Alternative) is warranted. A decision to construct such a facility would require separate environmental review and alternatives analysis that has not been done as part of the CALFED Program's programmatic analysis (yr 1-7).

Additional Actions Required During Stage 1 (Throughout the Delta Region)

- < Fully implement actions, consistent with the MSCS, that mitigate for the direct and indirect environmental affects of project features and actions (yr 1-7).
- < Improve flood control through levee improvements, levee setbacks, channel dredging, and floodplain restoration to be fully consistent with regional ERP actions (yr 1-7).
- < Screen agricultural intakes to assure ecosystem protection (yr 1-7).

Environmental Water Account

An essential goal of the CALFED Program is to provide increased water supply reliability to water users while at the same time assuring the availability of sufficient water to meet fish protection and restoration\recovery needs as one part of the overall ERP. As a means to achieve these objectives, the CALFED Program will provide commitments under NCCPA and/or CESA and ESA to SWP and CVP export facilities only for the first four years of Stage 1. These commitments are based on fully providing water from existing regulatory means, a fully implemented EWA, flows and habitat restoration provided through the ERP, and the ability to obtain additional assets should they be necessary.

The EWA is a new water source provided to: (1) augment instream flows and Delta outflows; and (2) reduce Delta exports from CVP/SWP export facilities during key periods of fish and aquatic ecosystem concerns. The CALFED Agencies will also continue to work with other diverters in the Delta watershed to resolve local fishery-diversion conflicts based on the site-specific needs and opportunities for each diversion. The CALFED Agencies have crafted the EWA so that it has no effect on the existing water rights of other water right holders in the watershed.

Overall Purpose, Framework and Administration

The EWA will be established, as part of the **EWA Operating Principles Agreement**, to provide water for the protection and recovery of fish in addition to water available through existing regulatory actions related to project operations. The EWA Operating Principles Agreement will be interpreted to be consistent with this project description. To the extent that the EWA Operating Principles Agreement provides greater specificity, the EWA Operating Principles Agreement will be the controlling document.

The EWA will be funded jointly by the State and Federal governments and will be authorized to acquire, bank, transfer and borrow water and arrange for its conveyance. EWA assets will be managed by the State and Federal fishery agencies (the Service, NMFS, and DFG) in coordination with project operators and stakeholders. Initial acquisition of assets for the EWA will be made by Federal and State agencies (Reclamation and DWR). Subsequently, it is anticipated that acquisitions may be made pursuant to a public process that may take advantage of other agencies or third parties to acquire assets.

Baseline Level of Protection

DWR and Interior will provide a baseline of environmental protection. The CALFED Agencies recognize that the SWRCB may adjust the CVP and SWP responsibilities for complying with the 1995 Delta Water Quality Control Plan (WQCP), as part of its on-going Bay-Delta Water Rights Hearings. The outcome of those hearings may affect the nature of this baseline. The CVP's and SWP's regulatory baseline, primarily for fish needs, identified as Tier 1 in the EWA discussion below, will include:

< **1993 Winter-run Salmon Biological Opinion (NMFS)**

< **1995 Delta Water Quality Control Plan (SWRCB)**

At this time, DWR and Reclamation are responsible for meeting flow related objectives contained in this plan. The CALFED Agencies recognize that the SWRCB may adjust the responsibilities of these and other entities for complying with the 1995 Delta Water Quality Control Plan, as part of its ongoing Bay-Delta Water Rights hearings. Adjustment of responsibility to meet the Plan does not affect the baseline level of protection for purposes of the EWA.

CALFED Agencies will develop a strategy to deal with the rare circumstances when the CVP obligation under the WQCP exceeds the 450 TAF annual cap for use of CVPIA Section 3406(b)(2) water. In conjunction with the Governor's Drought Contingency Plan, the Agencies will use their available resources to create an insurance policy to eliminate impacts to water users, while not adversely affecting other uses.

< **1995 Delta Smelt Biological Opinion (Service)**

The export curtailment contained in the 1995 Delta Smelt Biological Opinion (item 2 on page 19), commonly referred to as the "2 to 1 inflow/export ratio", will be met by the Section 3406(b)(2) of the CVPIA and EWA. This objective calls for the SWP and CVP to reduce combined exports, below what is allowed in the 1995 Water Quality Control Plan (the 1995 WQCP allows exports to be 100% of the base San Joaquin River flow at Vernalis during the April-May pulse period), during a 31-day period in April and May. Reclamation and the Department of Water Resources intend that the reduced export pumping during this period will not reduce allocations to SWP. The CVP reduction in pumping will be conducted pursuant to the accounting policy for Section 3406(b)(2) of the CVPIA and/or through reimbursement by the EWA. The SWP will be reimbursed by the EWA for its participation in reducing exports pursuant to the 2 to 1 inflow/export ratio.

It should be noted that the CVP and SWP will be operated pursuant to the terms of the San Joaquin River Agreement. While the SJRA is in effect, the exports may be reduced beyond what is called for by the 2 to 1 inflow/export ratio and San Joaquin River flows may be augmented by water acquired from upstream sources during that same time period. Such an augmentation will not be included as part of the SWP share of Vernalis flow. While operating per the SJRA, the SWP will receive reimbursement from the EWA or pursuant to Section 3406(b)(2) for the difference between its 2 to 1 export and its export under the SJRA; and the additional CVP curtailment will be accounted for under the policy for Section 3406(b)(2) or reimbursed under the EWA.

< **Full Use of 800 TAF Supply of Water Pursuant to Section 3406(b)(2) of the CVPIA in Accordance with Interior's October 5, 1999 Decision, clarified as follows:**

Water Resulting from Refill of Reservoirs ("Reset"): Water which is available under the (b)(2) Policy as a result of refill of reservoirs following upstream releases ("reset") will not be used in a manner which results in increased export reductions. Upstream releases of (b)(2) water pumped by the SWP and made available to the EWA will not be subject to the "reset" provision.

Export Curtailments which Result in Increased Storage ("Offset"): Where a prescribed (b)(2) export curtailment result in a reduction in releases from upstream reservoirs and hence increased storage, the charge to the (b)(2) account will be offset to the extent that the increased storage will result in increased delivery (beyond forecast delivery at the time of the export curtailment) to south-of-Delta CVP contractors in the remainder of the water year. If such deliveries cannot be increased in that water year, such additional water stored in upstream reservoirs shall be available for other (b)(2) uses without charge. Where the delivery to export users in the remainder of the water year will

not be increased and end-of-year storage will be increased, there will be no offset to the charge to the (b)(2) account.

The Secretary of the Interior is expected to make a decision later this year on Trinity River flows, pursuant to the original Trinity authorization, the Trinity Restoration Act of 1984, and the CVPIA. The substance of the decision is unknown and therefore cannot be addressed at this time. It is separate and will not be affected by this decision.

Other Environmental Protections

The regulatory baseline above also assumes that other environmental protections contained in biological opinions, regulations or statutes remain in place. These protections include, without limitation, Level 2 refuge water supplies, as required by the CVPIA. The CVP will use its share of the benefits from joint point of diversion, to the extent available, to provide water required by its Level 2 refuge water supply mandates, but using such benefits will not create any limitation on the Level 2 supply available for refuges.

Operation Rules

The ground rules for operating the EWA are detailed in the EWA Operating Principles Agreement, executed by DWR, Reclamation, DFG, the Service, and NMFS. The ground rules are based on the principle that the EWA will provide flows allowing fish recovery while not resulting in uncompensated reductions in deliveries to south of Delta CVP/SWP contractors.

Asset Development

Immediate development of assets for the first year is critical to EWA success. Initial water purchases and lease of groundwater storage will be secured from willing sellers by the end of 2000. In addition to assets to be acquired annually, as shown in Table 1, an initial one-time acquisition of 200 TAF of south-of-Delta storage or its functional equivalent will be acquired from a variety of sources to assure the effectiveness of the EWA and provide assurances for SWP and CVP water supply/deliveries. This initial deposit will also provide collateral for the first year's borrowing. The related storage is intended to function as long-term storage for other EWA assets as they become available.

Borrowing agreements will allow the EWA to borrow water from the CVP and SWP for necessary actions during a water year as long as the water can be repaid without affecting the following year's allocations. To the extent practicable, borrowing from the SWP and CVP will be shared. The limitations on borrowing will be developed as part of the agreement. Source shifting agreements with south-of-Delta water providers for 100 TAF will be used to enhance the

effectiveness of the EWA, and to help provide assurance that SWP and CVP water deliveries will not be affected by EWA operations. To provide regulatory stability during the initial period of Stage 1, the CALFED Agencies will provide a commitment, subject to legal requirements, that for the first four years of Stage 1, there will be no reductions, beyond existing regulatory levels, in CVP or SWP Delta exports resulting from measures to protect fish under the ESA and CESA. This commitment will be based on the availability of three tiers of assets:

- < **Tier 1** is baseline water, provided by existing regulation and operational flexibility. The regulatory baseline consists of the biological opinions on winter-run salmon and delta smelt, 1995 Delta Water Quality Control Plan, and 800 TAF of CVP yield pursuant to CVPIA Section 3406(b)(2).

- < **Tier 2** consists of the assets in the EWA combined with the benefits of the ERP and is an insurance mechanism that will allow water to be provided for fish over and above Tier 1, when needed without reducing deliveries to water users. Tier 1 and Tier 2 are, in effect, a water budget for the environment and will be used to avoid the need for Tier 3 assets as described subsequently.

- < **Tier 3** is based upon the commitment and ability of the CALFED Agencies to make additional water available should it be needed. It is unlikely that assets beyond those in Tier 1 and Tier 2 will be needed to meet ESA requirements. However, if further assets are needed in specific circumstances, Tier 3 will be provided. In considering the need for Tier 3 assets, the fishery agencies will consider the views of an independent science panel. Although the CALFED Agencies do not anticipate needing access to Tier 3 water assets, the CALFED Agencies will prepare an implementation strategy for Tier 3 by August 2001, establish a timely scientific panel process, and identifying tools and funding should implementation of Tier 3 prove necessary.

Table 1. List of EWA assets. Some assets may be replaced by functional equivalents, if determined to be appropriate by the EWA Managing Agencies (Service, DFG, NMFS)

Action Description	Water Available Annually(Average)
SWP Pumping of (b)(2)/ERP Upstream Releases¹	40,000 acre-feet ²
EWA Use of Joint Point³	75,000 acre-feet
Export/Inflow Ratio Flexibility	30,000 acre-feet
500 cfs SWP Pumping Increase	50,000 acre-feet
Purchases - South of Delta	150,000 acre-feet
Purchases - North of Delta⁴	35,000 acre-feet
TOTAL	380,000 acre-feet
Storage acquisition	200,000 acre-feet of storage, filled when acquired in Year 1
Source-shifting agreement	100,000 acre-feet at any time

¹The EWA and the SWP will share equally the (b)(2) and ERP upstream releases pumped by the SWP after they have served their (b)(2) and ERP purposes.

²The amount of water derived from the first four actions will vary based on hydrologic conditions.

³The EWA will share access to joint point, with the CVP receiving 50% of the benefits.

⁴This is the amount of water targeted for the first year; higher amounts are anticipated in subsequent years.

CALFED Science Program

The CALFED Science Program includes implementing the Comprehensive Monitoring, Assessment, and Research Program (CMARP) as an integral aspect of the overall CALFED Program. The scope of the Science Program will encompass all elements of the CALFED Program: ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and levees integrity. The purpose of the Science Program is to provide new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the CALFED Program. The Science Program will build on the work of the Interagency Ecological Program and other scientific efforts in the CALFED Program area.

The CALFED Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions, the effects of human stressors on ecosystem structure and function, and the ecological and other effects of individual CALFED Program actions. Monitoring key system functions (or indicators), completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process.

A preliminary CMARP report is an appendix to the Final Programmatic EIS/EIR. This report identified objectives and functions of CMARP, developed a conceptual framework for CMARP, presented a preliminary monitoring and focus research program design, and recommended an institutional structure for CMARP. Some actions pursued under the Science Program will result in take, and therefore will require authorization under NCCPA and/or CESA and section 7 or section 10(a)(1)(B) of the ESA.

Functions of the CALFED Program's Science Program include:

- < Developing and refining ecological conceptual models.
- < Identifying monitoring and research needs to support implementation and the evaluation of the CALFED Program. This includes program performance measures and indicators; also a monitoring plan for the ERP is being developed.
- < Data management, assessment, and reporting.
- < Providing for and coordinating independent scientific/technical review of the technical aspects of the CALFED Program.

The institutional structure of the Science Program is not completely determined at this time. The ERP has established an Interim Science Board to provide the ERP with independent scientific guidance and review. The CALFED Program's Management Group has appointed a temporary Science Oversight Team to accomplish the following tasks for the Science Program:

- < Develop science questions associated with Stage 1 management decisions.
- < Develop functions and structure of the Science Program.
- < Develop an initial list of program performance measures and indicators.
- < Assess feasibility of a Bay-Delta science center.
- < Develop coordination plans for science programs relevant to the CALFED Program.
- < Clarify issues of implementing adaptive management under the CALFED Program.

Proposed Science Program Stage 1 Actions

The CALFED Program will evaluate the following Science Program actions proposed for implementation in Stage 1. These proposed Stage 1 actions are representative of the overall set of proposed actions for the Science Program.

- < Periodic review and refinement of the monitoring, data assessment and research plan from a long term perspective (yr 1-7).
- < Periodic review and refinement of the monitoring, data assessment and research plan from a short term perspective which would include all elements of the Phase III, Stage 1 Program (yr 1-7).
- < Help management define triggers and time periods which determine the need for a change in program direction (yr 1-7).
- < Continue to develop and refine conceptual models to be used in evaluating actions undertaken by the programs. In keeping with the adaptive management format, the models will be continually updated with information generated by program actions (yr 1-7).
- < Evaluate the effectiveness of the adaptive management process on the program decision making process (yr 1-7).
- < Review the progress toward achieving overall CALFED Program goals and objectives and whether individual programs are progressing at similar paces (yr 1-7).
- < Complete monitoring identified by the Diversion Effects on Fisheries Team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7).
- < Design long-term, system wide, baseline monitoring with focused research to increase understanding of ecological processes and ways to reduce uncertainty; definition of needed studies is currently under development (yr 1-7).
- < Provide available data on need to reduce bromides, total dissolved solids, total organic carbon, pesticides and heavy metals (yr 5).
- < Provide available data on water quality in the south Delta and lower San Joaquin River (yr 1-7).
- < Monitor and assess the impacts of water use efficiency measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).
- < Prepare annual reports on status and progress, including such information as: performance of habitat restoration actions compared to expected results, summaries of any new information on the relative importance of various stressors, and any need for adjustments in actions or conceptual models (yr 1-7).
- < Analyze status and need for adjustments of actions for later stages (yr 5-7).
- < Monitor and report land use changes, such as agricultural land conversion, resulting from CALFED Program actions (yr 2-7).
- < Hire an interim science leader and subsequently hire a chief scientist (yr 1-2).
- < Appoint an Independent Science Board and an independent science panel for the EWA (yr 1-2).
- < Coordinate existing monitoring and scientific research programs (yr 1-7).
- < Refine the set of ecological, operational, and other predictive models that will be used in the evaluation process (yr 1-2).

- < Establish and refine performance measures and indicators for each of the program areas (yr 1-7).

Multi-Species Conservation Strategy

The MSCS serves as a biological assessment for the CALFED Program and describes the CALFED Program strategy for achieving compliance with the ESA, CESA, and NCCPA during implementation of the CALFED Program. As a biological assessment, it summarizes the CALFED Program and analyzes its effects on 244 listed, proposed, and candidate species, and species of concern. As a “conservation strategy” it outlines conservation goals for species that will be effected by the Program, and identifies strategies for achieving those goals and NCCPA and/or CESA and ESA compliance.

Conservation Goals and Prescriptions

The MSCS identifies conservation goals for 244 species as well as species prescriptions and conservation measures to achieve these goals. The CALFED Program has established a goal to recover 19 species, contribute to the recovery of 25 species, and maintain 200 species. A goal of “recovery” was established for those species whose recovery is dependent on restoration of the Delta and Suisun Bay/Marsh systems. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species long-term survival in nature is assured. Recovery is equivalent, at minimum, to the requirements for de-listing a species under ESA and CESA. The goal “contribute to recovery” was assigned to species for which CALFED Program actions affect only a limited portion of the species’ range and/or CALFED Program actions have limited effects on the species. To achieve the goal of contributing to a species’ recovery, the CALFED Agencies are expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. The goal “maintain” was assigned to species expected to be minimally affected by CALFED Program actions. For this category, the CALFED Agencies will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species. Actions may not actually contribute to the recovery of the “maintain” species; however, at a minimum, they will be expected to not contribute to the need to list a species or degrade the status of a listed species. The CALFED Agencies will also, to the extent practicable, improve habitat conditions for these species.

Specific prescriptions were developed to achieve the conservation goals described above for each species. The prescriptions incorporate the measures identified in State and Federal recovery plans, where available, other relevant information, and professional judgement. Prescriptions include measures to enhance habitats and species and are not directly linked to the CALFED Program’s adverse impacts.

As the CALFED Program proceeds during the next 30 years, it is anticipated that California's landscapes could change significantly and that new information will be available through research and monitoring. Consequently, species goals and prescriptions will likely change through time through adaptive management, and as new recovery plans are finalized or updated.

Framework for Federal Endangered Species Act Compliance

The program will be continuously monitored to ensure that it is implemented as intended and the elements necessary for regulatory commitments, i.e., conditions as described in the Conservation Agreement are implemented. In the event that information from monitoring or any other source indicates that any of the Program elements necessary for regulatory commitments are not being met or will not be met, notification will be provided, by the agency which developed the information, to the affected Agencies, as appropriate. Upon notification, the affected agencies will meet promptly to identify and assess measures which can be taken to remedy any noncompliance or anticipated noncompliance with the conditions, and will immediately implement measures. If the Service determines that a situation of noncompliance exists and the affected agencies are unable to remedy noncompliance within a reasonable time period that the Service prescribes, not to exceed 60 days, the regulatory commitments will be suspended or terminated. Upon a determination of noncompliance, formal consultation will be reinitiated and the Service will issue a new or amended biological opinion with conditions prescribing alternative regulatory requirements. If the compliance with the conditions set out above is subsequently achieved, the initial regulatory commitments may be revised and reflected through new or amended programmatic biological opinions. Nothing described here will affect the Service from exercising our regulatory authority.

There are several issues that have been subject to interpretation in the 1995 delta smelt opinion relating to OCAP. These issues will need to be resolved pursuant to any reinitiation of section 7 consultation concerning the joint operations of the CVP and SWP should the EWA not be fully implemented. These issues include but may not be limited to 1) the amount of allowable exports during the San Joaquin River pulse flow in April-May, either under the VAMP or the WQCP Vernalis flow requirements, 2) The amount or extent of actions that must be taken at the "yellow light" stage of incidental take to avoid or minimize the direct and indirect effects of project operations and to avoid reaching "red light", 3) articulating the environmental baseline for which all subsequent section 7 consultations for actions that may affect delta smelt and Sacramento splittail will be evaluated against, and 4) other actions that may be deemed necessary at the time of reinitiation to provide the regulatory protection for delta smelt and Sacramento splittail.

The MSCS describes program-level strategies to achieve compliance with ESA, including strategies to address the indirect effects of the CALFED Program, and strategies for completing tiered consultations. The CALFED Program's compliance strategies will, in part, be developed and implemented as part of future CALFED Program projects tiered from this programmatic biological opinion.

Entities implementing CALFED Program actions which may effect listed species will develop ASIPs. ASIPs will be developed for individual CALFED Program actions or groups of actions when enough detailed information is available about the actions to analyze fully their impacts on species and habitats, and develop appropriate measures to avoid, minimize, and compensate for impacts. Development of ASIPs will be coordinated with the wildlife agencies so that the particular set of measures necessary to be implemented to achieve FESA compliance will be incorporated as part of the proposed ASIP. The particular set of measures included will likely be unique to each ASIP. The MSCS describes programmatic avoidance, minimization, and compensation measures to be incorporated into ASIPs. However, most ASIPs will also include additional measures not described in the MSCS, and possibly a set of ERP actions. For example, a levee improvement project in the Delta may include a particular set of MSCS avoidance, minimization, and compensation measures, additional measures unique to the proposed project, and ERP actions to restore wildlife habitat adjacent to or on the improved levee. ASIPs will be reviewed for compliance with the NCCPA, CESA, and ESA through the section 7 consultation process, or through the section 10 habitat conservation planning process.

Service Area Effects

Implementation of the CALFED Program's Preferred Program Alternative related to water supply reliability will be determined largely in an incremental fashion through an adaptive management process. Because of this, it is not possible to accurately estimate the scope of potential service area effects on species and habitats. Project-level or site-specific impacts may not be known until Phase III of the CALFED Program (implementation). Therefore, the CALFED Program strategy for addressing indirect effects includes identifying a short-term strategy based on critical species needs for recovery and restoration, and a long-term strategy for dealing with impacts that cannot be predicted when the biological opinions are issued. These strategies attempt to address these effects at the project level and at the program level. Success of these strategies rely on implementing all of the elements described below :

- < Providing technical assistance and other support to entities preparing Habitat Conservation Plans (HCPs) or conservation programs addressing effects of land use changes in the service.
- < Evaluating each future water supply reliability program or project during planning and including appropriate measures to address indirect effects in the ASIPs. This may include implementing the applicable conservation measures already in the MSCS to conserve species relative to service area effects or developing new measures.
- < Developing or contributing to conservation programs to address the critical needs of species in CALFED Program service areas not already covered by conservation plans.

Governance Plan

The interim governance structure will be in place from the time of the Programmatic ROD until a long-term permanent structure is adopted through State and Federal legislation. For interim governance, CALFED Agencies propose adoption of the current CALFED Program structure being used during the planning stage, but adapted for implementation. The interim governance structure, including identification of how decisions will be made, will be set forth in a new Implementation MOU which the agencies will develop and execute by the time of the ROD. The current structure is made up of the Policy Group reporting to the Governor of California and the Secretary of the Interior, public advisory groups, the CALFED Program Executive Director and staff, and State and Federal agencies and teams. This structure, with additions and modifications, will serve to bridge the gap until a permanent commission is established.

Interim Program Management Responsibilities

The Levee System Integrity Program management will remain with DWR, DFG, and other existing agencies. The CALFED Program will continue to manage the ERP, in coordination with the appropriate agencies. The State and Federal fishery agencies (DFG, Service, NMFS) will manage the EWA assets, in coordination with the ERP and water project operations (Reclamation and DWR). CALFED Program will be assigned program management for the Watershed Program. The CALFED Program and appropriate agencies (such as Reclamation, EPA, DHS, DWR, and SWRCB) will manage the Drinking Water Quality Program. For the Water Transfer Program, CALFED Program will provide program direction, oversight, and coordination among CALFED Program areas and among agencies with jurisdiction over water transfers and use of project facilities. Agencies with jurisdiction over water transfers would retain authority to implement any changes in their own policies or procedures. DWR, Reclamation, and CALFED Program will manage the Water Use Efficiency Program. DWR, Reclamation, and CALFED Program will manage the Storage Program Element. The CALFED Program will manage the Conveyance Program element. The CALFED Program will manage the Science Program.

Milestones

Milestones are a list of ERP, MSCS, and Water Quality Program actions the CALFED Program will fully implement in Stage 1 to address covered species. Milestones are a subset of the ERP actions the fish and wildlife agencies expect will be implemented in Stage 1, to achieve the CALFED Program's conservation goals. The complete list of milestones appears in Appendix A, Table A-4.

The CALFED Program's objectives for ecosystem restoration are to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support

sustainable populations of diverse plants and animal species. The ERP, MSCS, and WQP are the principal CALFED Program elements designed to meet these objectives. Implementation of the ERP will be informed by the Science Program, which will conduct pertinent research, and monitor and evaluate the implementation of ERP, MSCS, and WQP actions. The ERP, MSCS, WQP, and the Science Program are directly relevant and important for FESA, CESA and NCCPA compliance. To ensure that the ERP, MSCS, and WQP are implemented in a manner and to an extent sufficient to sustain programmatic FESA, CESA and NCCPA compliance for all CALFED Program elements, the USFWS, NMFS and DFG (the Fish and Wildlife Agencies”) have developed Milestones for ERP, MSCS, and WQP implementation. The Milestones include Science Program actions that are relevant for ERP, MSCS, and WQP implementation. The Fish and Wildlife Agencies have concluded that the Milestones, if achieved along with expected additional ERP actions, define an adequate manner and level of ERP, MSCS, and WQP implementation for Stage 1.

The ERP, MSCS, and WQP are the CALFED Program’s blueprint for the restoration of the Bay-Delta. The MSCS is not a separate blueprint or supplemental restoration program and does not supplant the ERP. The measures and goals in the MSCS are consistent with the ERP’s measures and goals. However, the MSCS is a conservation strategy and a regulatory compliance strategy for the entire CALFED Program. The MSCS addresses the potential adverse effects and beneficial effects of all program actions, including ERP actions and other program actions such as levee system integrity actions, water conveyance actions and storage actions. Based in large part on the ERP, the MSCS’ premise is that the CALFED Program as a whole, including all program elements, will improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The ERP therefore serves two purposes: 1) to achieve program objectives for ecosystem restoration and species recovery, and 2) to enable actions from all CALFED Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

To serve both of these purposes, ERP implementation must be informed both by the best available scientific information and by information about the implementation of other CALFED Program actions. Information about the implementation of other program actions is necessary to ensure that they do not conflict or limit the success of the ERP. In addition, ERP restoration actions must be implemented concurrent, and at a commensurate level, with the implementation of other program actions to ensure that the CALFED Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. The Milestones are intended to establish, based on the best information currently available, a group of actions derived from the ERP, MSCS, and WQP that 1) establish an adequate level of implementation during Stage 1, 2) would not be inhibited by proposed Stage 1 actions in other CALFED Program elements, and 3) would enable proposed Stage 1 actions in other CALFED Program elements to be completed in compliance with FESA, CESA and the NCCPA through implementation of ASIPs.

The CALFED Program's development of annual, near-term, and long-term ERP implementation priorities and strategies will be based on the goals and objectives of the ERP Strategic Plan, the MSCS, FESA recovery plans, and implementation plans developed for specific ecological management zones, and will be informed by the Science Program. The Milestones represent the MSCS' goals and objectives with respect to the ERP. As with ERP implementation priorities and strategies generally, the Fish and Wildlife Agencies intend that the Science Program will provide information concerning the Milestones. Specifically, the Fish and Wildlife Agencies will seek review within the Science Program of 1) whether other CALFED Program elements conflict with implementation priorities and strategies so as to limit the success of the ERP, MSCS, and WQP, and 2) whether the implementation priorities and strategies will ensure that the CALFED Program as a whole continues to increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta. As the Science Program develops information about implementation, the USFWS, NMFS and DFG will revise the Milestones as necessary, consistent with the FESA and NCCPA and/or CESA.

The CALFED Program will develop annual ERP implementation plans using the ERP Strategic Plan for Ecosystem Restoration and the MSCS. Members of the Science Program, the Agency/Stakeholder Ecosystem Team (ASET) the CALFED Program will work cooperatively to develop annual ERP implementation plans and to define the long-term priorities for the ERP. The Fish and Wildlife Agencies will participate fully in the process for developing annual ERP implementation plans. The Fish and Wildlife Agencies' participation will include, but not be limited to, participation in the ASET. Through participation in the annual ERP implementation plan process, the Fish and Wildlife Agencies will help ensure 1) that each plan is based on the best available information regarding ecosystem restoration and the Bay-Delta system, 2) that each plan will achieve substantial progress toward meeting the Milestones, and 3) that the Science Program will provide information to achieve applicable Milestones. As new information becomes available and conceptual models are tested and refined as part of this process, the Fish and Wildlife Agencies anticipate that priorities reflected in the Milestones may change, and that new issues or questions may emerge. Through the annual ERP implementation process, Science Program members, the CALFED Program, and ASET members may propose revisions to the Milestones based on pertinent new information. If the Fish and Wildlife Agencies determine that the proposed revisions are warranted and are consistent with FESA and the NCCPA and/or CESA, the Fish and Wildlife Agencies will revise the Milestones accordingly.

The Fish and Wildlife Agencies will not approve revisions to the Milestones that would cause or allow an effect to Covered Species or critical habitat designated under FESA that was not considered in the programmatic regulatory determinations, or would otherwise require the re-initiation of consultation under 50 CFR §402.16. Consequently, the USFWS and NMFS expect that their approved revisions to Milestones can be incorporated in each agency's programmatic

biological opinions without re-initiating consultation under §7 of FESA. DFG will incorporate its approved revisions to the Milestones by amending the DFG Approval and Supporting Findings for the MSCS.

It will not be possible to gauge the progress of Milestone implementation for a few years, once Phase III begins. Consequently, over the first four years the Wildlife Agencies will base success of CALFED Program Implementation upon the criterion that the ERP is fully funded. However, the criterion for success at the end of Stage 1 will be implementation of the Stage 1 Milestones.

The CALFED Program will submit an annual report to the Governor, the Secretary of the Interior, the State Legislature and the Congress that describes the status of implementation of all CALFED Program elements by December 15 of each calendar year. The report will document the status of all actions taken to meet CALFED Program objectives in Stage 1. Among the actions addressed in the report will be the completion of key projects and milestones identified in the ERP. Progress in achieving the ERP-MSCS Milestones will be included in the portion of the annual reports concerning the ERP.

Summary of Key Planned Actions

The following key actions are considered relevant to this biological opinion and part of the project description and, are therefore, requisite in conducting the effects analysis:

Program-wide

1. The conservation actions described in the Description of the Proposed Action will be implemented, including, but not limited to, the Ecosystem Restoration Program Plan, the Water Quality Program Plan, the Watershed Program Plan, and the Multi-Species Conservation Strategy and its strategy for addressing indirect, service area effects. These actions will be implemented consistent with the Science Program and adaptive management, as described in the **Description of the Proposed Action**.
2. CALFED Agencies will obtain funding sufficient to implement the conservation elements and strategies, as necessary, to implement this biological opinion.
3. The various CALFED Program elements, strategies, and projects will be implemented in concert with the ERP, MSCS, EWA, and WQP to achieve the multiple goals of the CALFED Program; and will be implemented such that the net effects to species and their habitats are positive and are consistent with recovery goals.
4. The CALFED Program will utilize comprehensive monitoring and adaptive management to assess projects and programs.

5. Projects and programs that are not in conformance with State and Federal recovery plans will be modified.
6. The CALFED Program will implement projects to achieve the milestones (Appendix A, Table A-4) established for the ERP, MSCS, and WQP.
7. Discharges into surface water bodies and waterways resulting from CALFED Program actions will comply with the standards set forth in the Description of the Proposed Action for the biological opinion on the Environmental Protection Agency's Promulgation of Numeric Criteria for Priority Toxic Pollutants for the State of California; California Toxics Rule (CTR) (Service File No. 1-1-98-F-21), in accordance with applicable implementation plans.
8. Entities implementing CALFED Program actions will comply with all applicable environmental laws.
9. Reclamation and DWR will consult on all new and modified water contracts within their discretion resulting from a CALFED Program action that may affect listed species, including changes from Agriculture to Agriculture/Municipal and Industrial uses.

Levee System Integrity Program

10. Levee integrity improvement elements will be consistent with ERP actions and MSCS conservation measures, so that levee integrity and ecosystem and species recovery advance simultaneously.
11. The Service, NMFS, and DFG will be involved in planning Levee System Integrity Program projects to ensure that ERP implementation is not impaired by levee program actions and adverse effects of levee actions are fully mitigated.
12. Development and implementation of CALFED Program plans for rehabilitating Suisun Marsh levees will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans.
13. Levee repair/improvements will be constructed using levee set-backs and soft-fixes (bio-technical solutions) to the extent practicable.

Water Quality Program

14. The CALFED Program will implement projects to achieve the milestones established for the WQP in Stage 1. In the event the milestones are not achieved during Stage 1, the CALFED agencies will reinitiate consultation with the wildlife agencies.

Ecosystem Restoration Program

15. The CALFED Program will implement projects to achieve the milestones established for the ERP in Stage 1. In the event the milestones are not achieved during Stage 1, the CALFED agencies will reinitiate consultation with the fish and wildlife agencies.
16. The ERP will be implemented in a manner that will achieve species prescriptions and recovery goals of covered species by year 30 of the CALFED Program. Stage 1 milestones establish the trajectory for achieving recovery goals for the first 7 years.

Water Use Efficiency Program

17. Development and implementation of the WUE will be consistent with the goals and objectives of the ERP and MSCS, including State and Federal recovery plans. Program actions will be planned in conjunction with the Service, NMFS, and DFG, in compliance with FESA, CESA, and NCCPA, as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program). Program actions will be funded so that it is assured that appropriate conservation measures for listed species will be included in program actions.

Water Transfers Program

18. No water transfers resulting from CALFED actions will occur if it would result in adverse effects on fish and wildlife until consultation under section 7 and NCCPA and/or CESA is completed. Reclamation and DWR will consult on all proposed 3rd party water transfers that may affect listed species and their native habitats. Additionally, the EWA will not be charged for curtailed 3rd party transfer opportunities.
19. EWA and Level 4 Refuge water supply transfers will have priority for conveyance over other transfer obligations.
20. In all instances in which a water transfer resulting from a CALFED action may affect listed species and their habitats, the fish and wildlife agencies will determine whether adverse impacts are likely to occur.

Watershed Program

21. Development and implementation of the Watershed Program will be consistent with the goals of the ERP and MSCS, including State and Federal recovery plans. Program actions will be planned in conjunction with the Service, NMFS, and DFG, in compliance with FESA, CESA, and NCCPA,

as appropriate. Program development will be coordinated with other CALFED Programs (WQP, ERP, MSCS, and Science Program). Program actions will be funded so that it is assured that appropriate conservation measures for listed species will be included in program actions.

Water Management Strategy

Specific key actions are provided for storage, conveyance, EWA, and other programs.

Storage

22. Storage sites will be selected through a screening process which includes applicable environmental requirements.
23. CALFED agencies will comply with section 7(d) of the ESA, which prohibits making any irreversible or irretrievable commitment of resources, for any potential new storage site or modified storage site prior to achieving project-specific compliance under section 7(a)(2) of the ESA. Additionally, CALFED agencies will acknowledge, research, analyze, and provide information on growth-inducing impacts to the Service on all storage projects as well as other indirect effects.
24. Tiered project specific analyses of potential storage improvements will identify and result in the selection of alternatives that are capable of being mitigated with appropriate mitigation sites and operational requirements; where the compensatory mitigation is highly likely to be successful; with the project specific compensatory mitigation implemented concurrent with, or in advance of, the adverse effects associated with construction and implementation of the project; where construction and operation of the project will not result in jeopardy to listed or proposed species or adverse modification of critical habitat; and where the project will not result in substantial degradation of the aquatic environment.
25. Any and all conveyance structures (e.g., canals, pipelines), recreation, roads, and similar developments associated with or proposed in conjunction with proposed expansions of existing storage facilities or proposed new storage facilities will be evaluated thoroughly for their impacts to Federal or State listed species and those species evaluated under the MSCS. If, through the informal or formal consultation process, it is determined by the Service, NMFS, and DFG (for State listed species) that project-related impacts would threaten the long-term viability of Federal or State listed species or those species evaluated under the MSCS, the proposed project(s) will be modified or dropped from consideration.

Conveyance

26. Consistent with the Service's regulatory authority, no water developed by any CALFED agency

from a CALFED Program element will be delivered or applied outside current contract service areas, if listed species may be affected, until either formal or informal consultation is complete. In some cases, deliveries in excess of the average historical delivery amounts to water districts may result in changes in land-use practices in the districts and trigger the need for informal consultation between the CALFED agencies and the Service. Once formal project-specific consultation has occurred that is in compliance with this opinion, it is assumed that changes in land-use practices, and impacts to listed and proposed species, in the district have been addressed.

27. In proceeding with the South Delta Improvement Program, CALFED agencies shall implement ecosystem restoration in the lower San Joaquin river and south Delta (generally, south of Empire Cut) in advance of or concurrent with impacts resulting from south Delta facility improvements.
28. In instances where landowners in the south Delta directly benefit from CALFED Program actions, CALFED Agencies will secure written agreements from the land owners to allow access for screening of agricultural and municipal diversions to protect fish consistent with the screening priorities established by the CALFED Program. If monitoring is necessary, access for monitoring will be allowed with reasonable notification. When the DFG, NMFS and Service, in consultation with the CALFED Agencies, determine that a diversion requires screening, the landowner will allow the diversion to be screened in accordance with the aforementioned agreement. If the CALFED Program is not substantially achieving screening program objectives, the CALFED Agencies will reinitiate informal or formal consultation.
29. When implementing EWA export reductions, the water cost associated with decreased exports will be charged against current facilities capabilities as constrained by current regulation. Any future increases in exports resulting from CALFED conveyance improvements will have operational rules developed through consultation with the fish and wildlife agencies to ensure consistency with EWA Operating Principles, and the goals of restoration and recovery for aquatic species.
30. In the interim prior to installation of permanent operable barriers, DWR will apply for and obtain permits to allow the continued operation of the temporary barriers.
31. Prior to increasing pumping above current authorized levels, operational rules for use of additional export capability will be determined through ESA and NCCPA and/or CESA consultation on the project-specific environmental documentation prepared for the various conveyance elements. To offset potential impacts and to provide for recovery of fishery populations, additional measures will be developed which would allow for protection of fish. These additional measures may include, but are not limited to: (a) screening, (b) new standards which limit the timing and magnitude of exports and water supply releases at key periods of fish concern, or (c) a combination of the two. ESA and NCCPA and/or CESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this approval.

32. An isolated conveyance facility will be evaluated as an alternative in the event it is determined that a through-Delta system will not accomplish the CALFED Program's goals for restoration and recovery of listed species, or its WQP goals. The study will be developed through a peer-review process to ensure objective analysis.

EWA

33. All EWA fixed assets (i.e. purchases) are acquired each year.
34. The EWA Operational Principles Agreement is signed and fully implemented.
35. The project agencies shall request clarification with the Service, DFG and NMFS on any points that appear to be ambiguous related to fishery actions for the EWA.
36. If EWA assets are depleted and the Service, NMFS, and DFG determine Tier 3 is necessary, Tier 3 assets will be available to protect fish.
37. As new water storage and conveyance projects are being planned, potential fishery impacts will be assessed. To offset potential impacts and to provide for recovery of fishery populations, additional operational rules will be developed which would allow for protection of fish. These operational rules may include but not limited to (a) limits on the timing and magnitude of exports and water supply releases at key periods of fish concern, and (b) new sharing formulae to increase EWA assets, which would allow the EWA to offset impacts and implement restoration actions. ESA coverage for such actions would come from separate consultation for OCAP or in consultations tiered from this opinion, as appropriate.

Science Program

38. The Science Program will complete annual reports describing program progress and compliance of all CALFED program actions within this NCCPA Approval and biological opinions.

Multi-Species Conservation Strategy

39. CALFED agencies will consult with the DFG and the Service or request technical assistance, as appropriate, to determine whether any future CALFED Program actions (including water transfers and permanent assignments of water) may affect listed or proposed species before signing a ROD or a FONSI which is tiered from the Programmatic EIS.
40. The list of evaluated species will be reviewed and revised periodically by the Service, NMFS, and DFG to add and remove species, as appropriate, and to review the recovery objective (R, r, or m) for species for their appropriateness.

41. The Service will work closely with other CALFED agencies, water users and others, providing them with maps of listed species habitats within service areas. The Service will guide entities through the consultation process or provide technical assistance, as appropriate, to address project-specific effects.
42. Entities implementing CALFED Program actions will complete tiered, project-specific consultation with the Service, NMFS, and DFG, as appropriate, through completion of Action-Specific Implementation Plans, as described in the MSCS.
43. The CALFED agencies will closely coordinate with the Service, NMFS, and DFG during development and implementation of all Action-Specific Implementation Plans.
44. The strategy for addressing service-area effects described in the MSCS will be implemented prior to districts or areas receiving improved water supplies or reliability resulting from CALFED actions if the analysis has determined that there will be effects. The strategy may include tools such as: (1) assisting with or contributing to completion and implementation of HCPs that address service area effects, as described in section 10(a) of the FESA; (2) including measures to address indirect effects in ASIPs and completing project-specific section 7 consultations on the ASIPs; (3) contributing towards or developing and implementing a conservation program that addresses species critical needs; and implementing the applicable conservation measures, relative to service-area impacts, already in the MSCS.
45. The CALFED Program will monitor the baselines of the species addressed in this opinion. Monitoring (for the life of the CALFED Program's Preferred Program Alternative) will be implemented immediately to test and track the CALFED Program's objective that species' baseline are stable or increasing.
46. Any project-specific effects to listed species will be consulted upon following project-specific analysis and prior to the effect, and the CALFED agencies shall be adequately funded and staffed to complete tiered project-specific consultations from this opinion and track implementation of conservation actions.

III. Approval of MSCS and Supporting Findings

All NCCPs must contain certain substantive elements identified in the NCCP Act. And DFG must ensure that its approval of the MSCS is consistent with its responsibilities as a State agency under CESA. These findings explain and substantiate this NCCP Program Approval in accordance with CESA and the NCCPA. In addition, these findings present DFG's conclusions regarding the MSCS's consistency with DFG's non-regulatory, general process guidelines for NCCPs.

A. The NCCP Act

In addressing the scope and purpose of NCCP, the NCCP Act identifies the following essential NCCP elements:

1. An NCCP must regional or area-wide in scope (§2805(a).)

The geographic scope of CALFED includes two distinct areas, the “Problem Area” and the “Solution Area”. The Problem Area is defined as the legal Delta and Suisun Bay and Marsh. The Solution Area is much broader in extent than the Problem Area; it encompasses the Central Valley watershed, the upper Trinity River watershed, the southern California water system service area, San Pablo Bay, San Francisco Bay, portions of the Pacific Ocean out to the Farallon Islands, and a near-shore coastal zone that extends from about Morro Bay to the Oregon border.

As described above, the **MSCS Focus Area** includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries downstream of major dams, and the potential locations of reservoirs. The MSCS clearly addresses the protection and conservation of wildlife on broad, geographic scale.

DFG hereby finds the MSCS addresses wildlife conservation on an regional or area-wide scale, as required by Fish and Game Code Section 2805(a).

2. An NCCP must protect and perpetuate natural wildlife diversity (§2805(a).)

The MSCS provides comprehensive management and conservation of multiple wildlife species including, but not limited to, those species listed pursuant to the CESA. The MSCS and ERP have been developed to conserve twenty (20) natural communities and the species that depend on them. The MSCS contains conservation measures to enhance NCCP communities and evaluated species. The majority of measures designed to enhance NCCP communities and evaluated species incorporate and refine existing, ERP and other CALFED actions. NCCP habitat conservation measures are primarily aimed at conserving the quality and quantity of natural habitats. These enhancement conservation measures add additional detail to CALFED programmatic actions that would help achieve species prescriptions and recovery goals (MSCS Attachment E, Tables E-1 to E-3). Conservation measures to avoid, minimize, and compensate for adverse effects to NCCP communities and evaluated species caused by individual program actions are also described in Attachment E. These measures would be incorporated early in site-specific project development and would be specific components of a project to offset any adverse effects.

The ERP is the principal program element designed to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plants and animal species. The ERP contains over 600 programmatic actions throughout the Bay-Delta watershed aimed at the restoration of ecological processes; the protection, enhancement and restoration of functional habitats; the recovery and enhancement of species, species groups, and biotic communities; and the reduction of stressors (ERP, Volume II).

Comprehensive monitoring and assessment of program actions will provide the means to evaluate the CALFED Program's progress towards achieving ecosystem restoration goals and objectives and progress towards meeting prescriptions for NCCP communities and covered species. The CALFED Program will use the adaptive management process to monitor the Bay-Delta ecosystem, carry out management strategies, and conduct additional research. As the CALFED Program receives new information about the Bay-Delta ecosystem, CALFED will be able to determine whether its management prescriptions—including the MSCS conservation measures—are meeting its goals and objectives. CALFED will then have an opportunity to refine those management prescriptions as needed. Clearly, the CALFED Program will substantially protect and benefit species populations, habitats, and natural communities.

DFG hereby finds the MSCS substantially protects and perpetuates natural wildlife diversity, as required by Fish and Game Code Section 2805(a).

3. An NCCP must allow compatible and appropriate development and growth (§2805(a).)

CALFED and the MSCS have been developed against a backdrop of existing and ongoing Federal, State, and local efforts intended to conserve listed and other sensitive species within the MSCS Focus Area. CALFED will be consistent and synergistic with existing wildlife protection and recovery programs (MSCS Chapter 5). CALFED agencies that will implement CALFED actions have entered into a conservation agreement thereby agreeing to adhere to the MSCS when implementing CALFED actions. In addition, the MSCS provides the framework for making commitments to cooperating landowners that they will not be prevented from continuing their existing land uses because of the implementation of CALFED actions or MSCS conservation measures. Entities implementing CALFED actions will comply with FESA, CESA, and NCCPA through a simplified compliance process that tiers from the programmatic consultations. As described in Chapter 6 of the MSCS and in the Conservation Agreement, the MSCS accommodates compatible development and growth activities by creating a simplified permitting process.

DFG hereby finds that the MSCS allows compatible and appropriate development and growth, as required by Fish and Game Code Section 2805(a).

4. Must be consistent with planning agreements entered into for the purpose of preparing and implementing an NCCP (§2820)

Under Fish and Game Code Section 2810, DFG is authorized, but not required, to enter into planning agreements with any person for the purpose of preparing and implementing a natural community conservation plan to provide for comprehensive management and conservation of multiple wildlife species. A planning agreement identifies the scope of the plan to be prepared and the participating parties. Section 2820 of the Fish and Game Code states that NCCPs must be consistent with planning agreements as specified in Section 2810.

For the purposes of the MSCS, DFG has not entered into a planning agreement. However, the MSCS was prepared in accordance with the DFG's non-regulatory, general NCCP process guidelines (effective January 22, 1998) for planning agreements. Because DFG has not entered into a planning agreement for the MSCS, Fish and Game Code Sections 2810 and 2820 do not apply.

5. Provides for the conservation and management of species subject to take (§2835).

The MSCS provides for the conservation and management of all species for which the DFG may issue take authorization, as described in the ASIP process (MSCS Chapter 6). USFWS, NMFS, and DFG can authorize the incidental take of covered species under FESA, CESA and NCCPA based on the MSCS and ASIPs submitted by the proponents of specific CALFED actions.

USFWS and NMFS will evaluate each ASIP pursuant to Section 7 and/or Section 10(a) of FESA. The resulting action specific analysis for the evaluated species will be predicated on the programmatic biological opinions for CALFED. The action specific analysis will evaluate each ASIP to determine whether the ASIP, in conjunction with the MSCS, complies with Section 7 and/or Section 10(a) of FESA. If an ASIP meets Section 7 and/or Section 10(a) requirements, the incidental take of Federally covered species may be authorized.

DFG will evaluate each ASIP to determine whether the ASIP, in conjunction with the MSCS, meets the requirements of NCCPA. If an ASIP meets NCCPA requirements, DFG will provide to the proponent of the specific CALFED action(s) an NCCPA take authorization for State-covered species. If the CALFED action addressed in the ASIP may affect State-listed species that are not State-covered species, DFG will also determine whether the ASIP meets the requirements of Section 2081(b) of CESA and can authorize incidental take of such species accordingly.

Species that are extremely rare or limited in distribution may be included as State-covered

or Federally covered species. The MSCS specifies that mortality of such species that could be caused by CALFED actions must be avoided (see MSCS Table 4-5 for a list of these species). However, it is possible that some limited types of take (e.g., harassment) can be authorized to ensure that entities implementing CALFED actions are in compliance with FESA and CESA.

The take of other species must be avoided because of laws prohibiting DFG from authorizing the take of such species (California Fish and Game Code §3505, §3511, §4700, §5050, and §5515.) DFG has determined that implementation of the MSCS pursuant to the Conservation Agreement will not result in the death of individuals of the following species which are fully protected species or specified birds by the State of California: ring-tailed cat (*Bassariscus astutus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), American peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), California black rail (*Laterallus jamaicensis coturniculus*), California clapper rail (*Rallus longirostris obsoletus*), greater sandhill crane (*Grus canadensis tabida*), little willow flycatcher (*Empidonax traillii brewsteri*), white-tailed kite (*Elanus leucurus*), great egret (*Ardea albus*), snowy egret (*Egretta thula*), and osprey (*Pandion haliaetus*). This NCCP Approval is therefor not contrary to §3505, §3511, §4700, §5050, and §5515.

The DFG hereby finds that the MSCS provides for the conservation and management of all species that may be subject to take authorization as described in the ASIP process, as required by Fish and Game Code Section 2835.

B. NCCP Guidelines

NCCP Process Guidelines, adopted pursuant to §2835 of the Fish and Game Code for the general application of the NCCP Act, are designed to help planners provide for the regional protections of and perpetuation of biological diversity, meet NCCP regulatory requirements and to allow for flexibility in plan development. The NCCP Process Guidelines are nonregulatory and are not rigid, mandatory criteria for DFG approval. However, the MSCS substantially adheres to the Process Guidelines.

1. Scope. Natural communities, geographic area of plan and conservation goals for the plan area.

As described above, the MSCS Focus Area spans a broad geographic area which includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin Rivers and their tributaries downstream of major dams, and the potential locations of conveyance and water storage facilities (MSCS Section 1.8.1). The MSCS defines 20 NCCP communities (Sections 2.1-2.2), comprised of 18 habitats and two ecologically based fish groups, and defines goals and prescriptions for these communities (MSCS Table 3-2). The MSCS clearly addresses the protection and conservation of wildlife on broad, geographic scale.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to defining the natural communities, geographic area of the plan and conservation goals for the plan area.

2. Covered Species. Species to be conserved and managed within the plan area, subject to take authorization, and ecological needs of species addressed by plan.

The MSCS defines species goals and prescriptions for reaching these goals in Section 3.3 and Table 3-1 of the MSCS. The criteria used to select the species evaluated in the MSCS is described in Table 2-2. Species goals, State and Federal status, and potential effects of CALFED actions on evaluated species and FESA designated critical habitats are included in Table 2-2. The process for identifying a list of covered species from the list of evaluated species is described in Section 2.4 of the MSCS. The process for obtaining incidental take authorization for covered species, using the ASIP process, and modifications to the covered species list are described in Section 6.2 of the MSCS. Information on the ecological needs of evaluated species was gathered for the MSCS and includes historic and current status and distribution of species in the CALFED Program Solution Area; species life history and habitat requirements; reasons for decline of species and designated critical habitats and recovery plan requirements of listed species. The MSCS clearly describes a strategy for conserving, managing, and providing for the ecological requirements of species in the MSCS Focus Area and a process (ASIPs) for obtaining take authorization for program actions.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to defining the species to be conserved and managed within the plan area; identifying species that will be evaluated for coverage under NCCP and may be subject to take authorization under the ASIP process, and in describing the ecological needs of species addressed by plan.

3. Anticipated activities. Activities or categories of activities anticipated to be authorized by plan participants.

The Project Description contained in this NCCP Approval provides a description of anticipated program actions. Covered activities include actions addressed in the Final Programmatic EIS/EIR. The MSCS (Chapter 3) summarizes these activities and the Project Description herein identifies program activities and priorities important for the NCCP Approval.

The MSCS (Chapter 4) describes the methodology used to evaluate the impact of program actions on NCCP communities and evaluated species. Attachment B contains a list of proposed CALFED actions analyzed in the MSCS and Attachment D contains a summary of the potential beneficial and adverse CALFED effects to NCCP communities and conservation measures

incorporated into the CALFED Program to avoid , minimize, and compensate for adverse effects. DFG has considered all proposed CALFED actions, as described in the Final Programmatic EIS/EIR, that would benefit or harm the MSCS's NCCP communities and evaluated species, including all ERP actions, for purposes of determining whether CALFED complies with CESA and NCCPA.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing the activities or categories of activities anticipated to be authorized by plan participants.

4. Principles of Conservation Biology. Scientifically sound principles of conservation biology used to formulate the plan.

The ERP is the principal CALFED Program component designed to restore the ecological health of the Bay-Delta ecosystem. The approach of the ERP is to restore or mimic the ecological processes and to increase and improve aquatic and terrestrial habitats to support stable, self-sustaining populations of diverse and valuable species. The Strategic Plan describes:

- < an Ecosystem-based management approach
- < an adaptive management process
- < the value and application of conceptual models
- < decision rules and criteria for selecting and prioritizing restoration actions
- < goals, objectives and rationale for ecosystem restoration
- < critical issues that need to be addressed early in the restoration program
- < opportunities for restoration
- < guiding principles for implementing the ERP
- < institutional and administrative considerations necessary to adaptive management

The MSCS and ERP address a broad range of species and habitat types throughout a large area, and encompass numerous large-scale, long-term actions. In preparing the MSCS and ERP, the CALFED Program has used the best available scientific information and collected input from a broad array of experts. During the development of the ERP, CALFED has convened panels of nationally-recognized, independent scientists to provide objective review and input to the ERP. Independent scientists and agency biologists were convened in technical workshops to provide recommendations for species goals and prescriptions and conservation measures for MSCS evaluated species. The ERP and MSCS have clearly been developed using sound scientific principles of conservation biology.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing scientifically sound principles of conservation biology used to formulate the plan.

5. Conservation Strategy. Conservation measures, compatible uses, schedule for implementation, and measurable goals.

Conservation measures- The MSCS contains conservation measures to avoid, minimize, and compensate for adverse effects on NCCP communities and evaluated species caused by individual CALFED actions; and measures to enhance NCCP communities and evaluated species that are not linked to the direct adverse effects of individual CALFED actions (MSCS Attachments D and E).

Compatible uses- The MSCS allows compatible uses by providing a simplified permitting process for both CALFED actions and non-CALFED actions (MSCS Chapter 6). Each implementing entity will include appropriate cooperating landowner protection measures and a plan for providing them in the ASIP prepared for the CALFED action to be implemented. Based on these measures, USFWS, NMFS, and DFG can authorize limited incidental take by cooperating landowners as necessary or appropriate to protect compatible existing uses of land and water that could be affected by the CALFED action or associated conservation measures.

Milestones or schedule for implementation- As described in the Project Description, to ensure that the ERP is implemented in a manner and to an extent sufficient to sustain programmatic FESA, CESA and NCCPA compliance for all CALFED Program elements, the USFWS, NMFS and DFG have developed milestones for ERP implementation (the “MSCS-ERP Milestones”, Appendix A, Table A-4). The MSCS-ERP Milestones include Science Program actions that are relevant for ERP implementation. DFG, USFWS, and NMFS have concluded that the MSCS-ERP Milestones, if achieved substantially as specified in the Agencies’ programmatic regulatory determinations, define an adequate manner and level of ERP implementation for Stage 1.

The MSCS-ERP Milestones are intended to establish, based on the best information currently available, a group of actions derived from the Ecosystem Restoration Program Plan that 1) establish an adequate level of ERP implementation during Stage 1, 2) would not be inhibited by proposed Stage 1 actions in other CALFED Program elements, and 3) would enable proposed Stage 1 actions in other CALFED Program elements to be completed in compliance with FESA, CESA and the NCCPA.

Measurable goals- The MSCS (Section 3.3; Table 3-1; Attachment E) describes species goals and prescriptions for reaching species goals for all evaluated species. Goals for NCCP communities and prescriptions for reaching NCCP goals are also described in the MSCS (Sections 3.3; Table 3-2). The MSCS-ERP milestones, described in the previous section, also provide measurable goals which will be used to assess progress in implementing the ERP.

The Strategic Plan contains strategic goals and objectives of the ERP that address 1) recovery of endangered and other at-risk species and native biotic communities; 2) rehabilitation of natural ecological processes; 3) maintenance and enhancement of selected commercial and recreational harvest species; 4) protection and restoration of functional habitats; 5) reduction of non-native species, and 6) improvements in water and sediment quality.

In summary, the MSCS clearly describes conservation measures and measurable goals for NCCP communities and species. The Strategic Plan articulates recovery of at-risk native species and the protection of functional habitats and native biotic communities as primary goals of the implementation strategy. The MSCS clearly describes a simplified permitting process (ASIP process) that allows for compatible development to occur. The ERP-MSCS Milestones establish an adequate level of ERP implementation during Stage 1 that will allow other CALFED Program elements to be completed in compliance with FESA, CESA and the NCCPA.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing conservation measures, compatible uses, schedule for implementation, and measurable goals.

6. Monitoring. Monitoring program to ensure compliance with implementation, biological performance, and achievement of management goals and objectives.

The MSCS (Chapter 7) describes the manner in which CALFED will measure progress towards meeting prescriptions for NCCP communities and MSCS evaluated species primarily by monitoring the distribution and abundance of habitat types over time. The CMARP Plan (July 2000) describes an initial concept and framework for a monitoring and research program to implement, assess, and improve the ERP through adaptive management. The plan includes monitoring of physical processes that may change in response to CALFED actions, such as river flow below dams that can affect fluvial geomorphological processes. The plan includes monitoring of habitats affected by those processes such as channel form and riparian vegetation. The plan also includes monitoring of those species dependent on those habitats. The final ERP monitoring program will be designed to fulfill the monitoring and assessment needs of the MSCS.

Monitoring serves not only to ensure compliance and gauge the effectiveness of CALFED actions, but also makes CALFED's choices under the adaptive management process more apparent, helps CALFED to redefine biological goals, and assesses the status of species and habitat conditions. To ensure proper implementation of the MSCS, CALFED must monitor its success in attaining its NCCP community and evaluated species prescriptions. CALFED also must monitor its compliance with MSCS measures that are required for FESA and CESA compliance and specified in any subsequent Section 7 consultation, Section 10(a)(1)(B) permit, or NCCPA and/or Section 2081 authorization.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing a monitoring program to ensure compliance with implementation, biological performance, and achievement of management goals and objectives.

7. Adaptive Management. Flexible, iterative approach to long-term management of natural communities, habitat types, and species within the plan area.

As described in the Introduction, the CALFED Program includes provisions for applying an adaptive management process, which is an overarching principle of the Science Program. The Strategic Plan describes, in detail, the adaptive management process that will be employed to implement the ERP (Strategic Plan, Chapter 3). The adaptive management components of the MSCS are described in Chapter 7 and Chapter 8 of the MSCS. The CALFED Program will periodically evaluate the effectiveness of the conservation measures for NCCP communities and evaluated species and modify these measures when necessary. The CALFED Program's strategic approach for implementation includes staged implementation and staged decision making (Implementation Plan, Chapter 1). Throughout the implementation period, monitoring will provide information about overall conditions in the Bay-Delta and on the status and trends of natural communities. Clearly, adaptive management is emphasized throughout the CALFED Program as the process by which program implementation will occur.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing a flexible, iterative approach to long-term management of natural communities, habitat types, and species within the plan area.

8. Funding. Funding sources to ensure conservation actions identified in the plan are implemented according to the schedule and goals set forth in the plan.

Funding to implement the MSCS and ERP will be part of the overall funding package for the CALFED Program (Phase II Report, Chapter 5). In Stage 1, the CALFED Program plans to invest over \$1 billion in ERP projects, in accordance with the priorities established in the Strategic Plan, in addition to funds necessary for the Environmental Water Account (EWA). An additional \$50 million will be required annually for the EWA for the first four years. It is anticipated that additional funding to support the EWA will be needed beyond the first four years. The level of assets required to support the continuation of the EWA beyond the first four years will be evaluated, as described in the ROD. The CALFED Program proposes to fund the ERP using a combination of State funding (including Proposition 204 funds), Federal funding, and user fees, with a minimum of \$50 million a year to be provided by each source. By the end of Stage 1, the CALFED Program will reevaluate the level of dedicated annual funding from State, Federal, and user sources to achieve the ERP goals.

Clearly, there is a substantial commitment to fund program actions, as described in the Phase II report, Conservation Agreement and ROD.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing a funding source to implement the various provisions of the CALFED Program.

9. Assurances. Assurances that provide for the long-term reconciliation of new land development in the planning area and the conservation and protection of endangered species.

Based on CALFED's progress in achieving its ecosystem objectives, USFWS, NMFS, and DFG will provide appropriate commitments regarding CALFED action(s) directly to the agency or other entity carrying out the action. The commitments will be based on the ASIP developed for the CALFED action in the MSCS's simplified permitting process. To the extent permitted by law, they will limit new or different conservation measures that would require additional commitments of land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources, beyond what is required in the ASIP. The specific scope and duration of USFWS's, NMFS's, and DFG's commitments will vary depending on the scope and duration of each CALFED action's impacts on covered species and whether the impacts will recur or continue over an extended period of time.

In addition, the MSCS provides the framework for making commitments to cooperating landowners that they will not be prevented from continuing their existing land uses because of the implementation of CALFED actions or MSCS conservation measures. Many landowners may be concerned that if the populations of threatened and endangered species increase within the Focus Area, FESA and CESA will restrict the use of land or water in or near the species habitat. Cooperating landowner programs are intended to address this concern and to preserve compatible land uses within the Focus Area.

DFG hereby finds that the MSCS substantially adheres to the Process Guidelines with respect to describing how assurances will be provided for the long-term reconciliation of new land development in the planning area and the conservation and protection of endangered species.

C. CESA

CESA states,

“The Legislature further finds and declares that it is the policy of the state that state

agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat which would prevent jeopardy.

Furthermore, it is the policy of this state and the intent of the Legislature that reasonable and prudent alternatives shall be developed by the department, together with the project proponent and the state lead agency, consistent with conserving the species, while at the same time maintaining the project purpose to the greatest extent possible. (§2053).”

CESA also requires that all State agencies, boards, and commissions shall seek to conserve endangered species and threatened species and shall utilize their authority in furtherance of the purposes of CESA (§2055). DFG must ensure that its approval of the MSCS does not conflict with this responsibility.

DFG hereby finds that the MSCS , if properly implemented, will not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species. DFG further finds that the MSCS will assist in the conservation of endangered species, threatened species and other species of concern.

III. DFG Approval

Based on the foregoing analysis and findings, DFG finds,

- < that the MSCS meets all necessary requirements for a natural community conservation plan;
- < that the MSCS prescribes a mitigation strategy under which each project covered by the MSCS will be required to provide mitigation or conservation that is proportional to the project’s expected impacts to covered species; and
- < that the mitigation strategy described in the MSCS evidences a clear nexus between mitigation required for projects covered by the MSCS and projects’ expected impacts to covered species.

Based on these findings, pursuant to §2820, DFG hereby approves the MSCS for the CALFED Program.

IV. Scope and Duration of NCCPA Program Approval

A. Covered Species

1. Covered species list

The potential impacts to evaluated species and the rationale for including or excluding species as covered species under the NCCP is described in Table A-1 (Appendix A). Potential beneficial effects of proposed ERP actions was determined, based in part, on the ERP targets for habitat protection, enhancement, and restoration described in Table A-2 (Appendix A). The list of NCCP covered species is included in Table A-3 (Appendix A).

2. Additions of new species to the list of Covered Species

If a species that is not a covered species, but that is known to occur or has the potential to occur in the Focus Area, is proposed for listing pursuant to FESA or CESA, then USFWS, NMFS, and DFG will determine whether additional conservation measures beyond those described in the MSCS are necessary to comply with FESA and NCCPA. If additional measures are not necessary, the species will be added to the DFG covered species list, and take of such species may be authorized with other covered species pursuant to ASIPs approved by USFWS, NMFS, and DFG.

If additional measures are necessary, USFWS, NMFS, and DFG will work with CALFED and entities implementing CALFED actions to identify and implement the necessary measures. If USFWS, NMFS, and DFG determine that additional measures are necessary, they shall give preference where possible to measures that do not increase restrictions on the use of land or water. Once the additional measures are identified, they will be incorporated into the MSCS and the new species will be added to the DFG covered species lists. Take of the species may thereafter be authorized pursuant to ASIPs approved by USFWS, NMFS, and DFG.

If it is not practicable to revise the MSCS to allow for the addition of the species, USFWS, NMFS, and DFG, during review of the ASIPs, will determine the additional measures necessary to avoid, minimize, and compensate for impacts on the species. In such cases, in addition to determining whether the ASIP implements the MSCS with respect to the covered species, USFWS, NMFS, and DFG will determine whether the ASIP adequately addresses the impacts on the new species. If USFWS, NMFS, and DFG determine that additional measures are necessary, they shall give preference where possible to measures that do not require further restrictions on the use of land or water. The additional measures may be identified by USFWS, NMFS, and DFG at or after the time the species is proposed for listing.

B. Process for obtaining incidental take authorization

1. Action-Specific Implementation Plans

As described above, the MSCS provides for the conservation and management of all species for which the DFG may issue take authorization, as described in the ASIP process (MSCS Chapter 6). USFWS, NMFS, and DFG can authorize the incidental take of covered species under FESA, CESA and NCCPA based on the MSCS and ASIPs submitted by the proponents of specific CALFED actions. To fulfill the requirements of FESA Sections 7 and 10 and California Fish and Game Code Sections 2835 and 2081, as applicable, each ASIP must adhere to the following outline:

- < a detailed project description of the CALFED action or group of actions to be implemented, including site-specific and operational information;
- < a list of evaluated species and any other special-status species that occur in the action area;
- < an analysis identifying the direct, indirect, and cumulative impacts on the evaluated species, other special-status species occurring in the action area (along with an analysis of impacts on any designated critical habitat) likely to result from the proposed CALFED action or group of actions, as well as actions related to and dependent on the proposed action;
- < measures the implementing entity will undertake to avoid, minimize, and compensate for such impacts and, as appropriate, measures to enhance the condition of NCCP communities and evaluated species, along with a discussion of: 1) a plan to monitor the impacts and the implementation and effectiveness of these measures; 2) the funding that will be made available to undertake the measures, and 3) the procedures to address changed circumstances;
- < measures the implementing entity will undertake to provide commitments to cooperating landowners, consistent with the discussion in Section 6.3.5 below;
- < a discussion of alternative actions the applicant considered that would not result in take, and the reasons why such alternatives are not being utilized;
- < additional measures USFWS, NMFS, and DFG may require as necessary or appropriate for compliance with FESA, CESA, and NCCPA; and
- < a description of how and to what extent the action or group of actions addressed in the ASIP will help CALFED achieve the MSCS's goals for the affected species (i.e., how the ASIP implements the MSCS).

The ASIPs will be based in large part on the biological data, CALFED information, impacts analysis, and conservation measures in this MSCS. The ASIPs must be consistent with the species goals, prescriptions, and conservation measures in the MSCS for evaluated species affected by the proposed CALFED actions. Additional information and analysis will be required for many actions. Further, to fully comply with FESA, CESA, and NCCPA for a CALFED action, USFWS, NMFS, and DFG may require the ASIP to include additional measures for certain listed species or species proposed for listing if, for any reason, the species were not evaluated in this MSCS. The MSCS will assist an implementing entity in preparing an ASIP by offering programmatic information on the expected impacts of CALFED actions on species and habitats and programmatic conservation measures for those impacts.

The ASIPs will not address all regulatory and permitting needs for CALFED actions. Rather, nearly all CALFED actions will require environmental review and permitting under other State and Federal laws before they can be implemented.

C. Modification of NCCPA Program Approval

This NCCPA Program Approval may be modified or amended at the discretion of the Director of DFG.

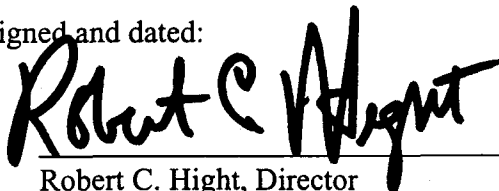
D. Suspension and withdrawal of NCCPA Approval

This NCCPA Program Approval may be suspended or withdrawn, in whole or in part, upon determination by the Director of DFG that the MSCS no longer satisfies the requirements of the NCCPA, or that the CALFED Program has not been implemented in accordance with the MSCS, the Conservation Agreement or this NCCPA Program Approval.

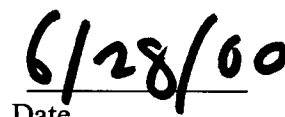
E. Duration of NCCPA Approval

This NCCPA Program Approval shall remain effective for thirty years, unless suspended, withdrawn or extended by action of the Director of DFG.

Signed and dated:



Robert C. Hight, Director
California Department of Fish and Game



Date

¹All further references are to the California Fish and Game Code, unless otherwise indicated.

Appendix A

Table A-1. Species Evaluated for Coverage under the Natural Community Conservation Plan

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Mammals			
California wolverine ⁴ <i>Gulo gulo</i>	m	No	Potential Impacts and Rationale: The proposed Ecosystem Restoration Program (ERP) actions are not likely to provide a measurable benefit to the species. Raising Shasta Dam will increase reservoir water levels and could inundate marginal-quality habitat surrounding the Shasta Lake reservoir.
Giant kangaroo rat <i>Dipodomys ingens</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.
Greater western mastiff bat [Western mastiff bat] <i>Eumops perotis californicus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities near occupied roost sites.
Merced kangaroo rat <i>Dipodomys heermanni dixonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.
Nelson's antelope ground squirrel [San Joaquin antelope squirrel] <i>Ammospermophilus nelsoni</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Ringtail ⁴ <i>Bassariscus astutus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to approximately 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors throughout its current and historical range within the Multi-Species Conservation Strategy (MSCS) focus area. Ringtail populations and distribution would be expected to increase measurably over the life of the CALFED Bay-Delta Program (CALFED). A relatively small portion of the species' populations and range would likely be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats.
Riparian brush rabbit ⁵ <i>Sylvilagus bachmani riparius</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions designed to protect the existing Caswell Memorial State Park population and to establish four additional populations within the Delta and along the San Joaquin River. The species' populations and distribution are expected to increase measurably over the life of CALFED because of riparian and floodplain habitat restoration within the historical range of the species. The species' populations could be affected by ERP actions to improve occupied habitat and to protect and expand the existing population at Caswell State Park.
Salt-marsh harvest mouse ⁴ <i>Reithrodontomys raviventris</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands throughout its current and historical range in the MSCS focus area and implement specific measures to assist in species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
San Joaquin Valley woodrat ⁵ [Riparian woodrat] <i>Neotoma fuscipes riparia</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions to protect the Caswell Memorial State Park population; restore 1,700–2,200 acres of riparian habitat within the species' historical range in the San Joaquin Valley; enhance 1,000 acres of stream channel meander corridor in the East San Joaquin Basin ecological management zone (EMZ); and implement specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats.
San Pablo California vole [San Pablo vole] <i>Microtus californicus sanpabloensis</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands and implement specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
Suisun ornate shrew [Suisun shrew] <i>Sorex ornatus sinuosus</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands and implement specific measures to achieve species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
Birds			
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would enhance over 205,000 acres of species foraging habitat (i.e., seasonal wetlands and agricultural lands) within or near traditional wintering areas in the Central Valley. No adverse impacts on the species' populations or habitat would be expected.
American peregrine falcon ⁴ <i>Falco peregrinus anatum</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 421,000 acres of species foraging habitat (i.e., permanent and seasonal wetlands) throughout its range in the MSCS focus area. No adverse impacts on the species' populations or habitat would be expected.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Bald eagle ⁴ <i>Haliaeetus leucocephalus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore or enhance riverine foraging habitat (e.g., restoration of up to at least 11,800 acres of riparian habitat and enhancement of 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area). Construction of new reservoirs would increase the area of suitable foraging habitat and potentially create suitable nesting habitat area adjacent to new reservoirs. No adverse impacts on the species' populations or habitat would be expected.
Bank swallow <i>Riparia riparia</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to 25,000 acres of stream channel meander corridors within the species' current and historical range in the MSCS focus area and implement specific measures to assist in achieving species recovery. Enhancement of stream channel meander corridors is expected to create and sustain suitable nesting banks as a result of rehabilitating the erosion and deposition processes along rivers. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats (e.g., setting back levees if implemented near occupied nesting colonies).
Black-crowned night heron (rookery) <i>Nycticorax nycticorax</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to 11,800 acres of potentially suitable riparian nesting habitat and that would restore and enhance up to approximately 421,000 acres of species foraging habitat (e.g., permanent and seasonal wetlands). The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of potential riparian nesting habitat along the Sacramento and San Joaquin Rivers and their major tributaries within the species' range in the MSCS focus area could be affected. A small portion of suitable wetland habitat within the species' range in the MSCS focus area could also be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied rookeries.
Black tern <i>Chlidonias niger</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 421,000 acres of species foraging and nesting habitat (i.e., permanent and seasonal wetlands) within the MSCS focus area. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance wetland habitats near occupied colonies.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
California black rail ⁴ <i>Laterallus jamaicensis coturniculus</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit primarily from ERP actions that would restore and enhance up to approximately 84,000 acres of potential foraging and nesting habitat (i.e., tidal and nontidal permanent wetlands) within the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs and implement specific measures to assist in achieving species recovery. Reducing the adverse effects of boat wakes along channels that support nesting territories is also expected to increase nesting success. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with CALFED actions to restore or enhance occupied tidal and nontidal emergent habitats, improve levee stability, and improve conveyance through the Delta.
California brown pelican ⁴ <i>Pelecanus occidentalis californicus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
California clapper rail ⁴ <i>Rallus longirostris obsoletus</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and enhance 6,200 acres of saline emergent wetlands throughout its current and historical range in the MSCS focus area and implement specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
California condor ^{4, 5} <i>Gymnogyps californianus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
California gull <i>Larus californicus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 810,000 acres of potential species foraging habitat (i.e., permanent and seasonal wetlands, and agricultural lands) throughout its range in the MSCS focus area. Foraging and resting habitat would also be increased with construction of new storage reservoirs. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential impacts would most likely be associated with ERP habitat restoration and enhancement actions. The likelihood for adverse impacts could increase if the species were to establish nesting colonies within the MSCS focus area at or near where CALFED actions would be implemented.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
California least tern ⁴ <i>Sterna antillarum browni</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions. There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions that could improve foodweb productivity in the Bay-Delta.
California yellow warbler [Yellow warbler] <i>Dendroica petechia brewsteri</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors within its current migration and historical nesting range in the MSCS focus area. A portion of restored riparian habitat will be designed specifically to provide suitable species nesting habitat. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. No adverse impacts on individuals would be expected. Potential adverse impacts could increase if the species were to reestablish nesting territories within the MSCS focus area at or near where CALFED actions would be implemented.
Cooper's hawk <i>Accipiter cooperi</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 11,800 acres of potentially suitable riparian nesting habitat and enhance 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area. A substantial portion of species habitat along the Sacramento and San Joaquin Rivers and their major tributaries could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats near occupied nesting territories.
Double-crested cormorant (rookery) <i>Phalacrocorax auritus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to approximately 11,800 acres of potentially suitable riparian nesting habitat along stream channels and enhance 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area. Foraging and resting habitat would also be increased with construction of new storage reservoirs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied rookeries.
Golden eagle ⁴ <i>Aquila chrysaetos</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to restore perennial grassland in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Grasshopper sparrow <i>Ammodramus savannarum</i>	m	No	Potential Impacts and Rationale: There is potential for a relatively small and possibly unmeasurable species and species habitat benefit associated with enhancement of grasslands incidental to enhancement of existing seasonal wetlands in the American River Basin EMZ. No adverse impacts on the species' populations or habitat would be expected.
Great blue heron (rookery) <i>Ardea herodias</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to approximately 11,800 acres of potentially suitable riparian nesting habitat, that would restore and enhance up to approximately 421,000 acres of species foraging habitat (i.e., permanent and seasonal wetlands), and potential foraging habitat associated with enhancing 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs, and along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries, could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied rookeries.
Great egret (rookery) <i>Ardea albus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 845,000 acres of potential species nesting and foraging habitat (i.e., riparian, permanent and seasonal wetlands, and agricultural) within the MSCS focus area. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs, and along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries, could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied rookeries.
Greater sandhill crane ⁴ <i>Grus canadensis tabida</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore or enhance up to approximately 258,000 acres of suitable wintering habitat (i.e., seasonal wetland, perennial grassland, and agricultural) at and near traditional wintering areas located in the Sacramento-San Joaquin Delta, and Butte Basin EMZs and implement specific measures to assist in achieving species recovery. A substantial portion of traditional species wintering habitat within the Sacramento Valley and the Delta could be affected. Potential adverse impacts would most likely be associated with CALFED actions to restore or enhance riverine, floodplain, and wetland habitats, improve levee stability, and improve conveyance through the Delta in occupied habitat areas.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Least Bell's vireo <i>Vireo bellii pusillus</i>	r	Yes	Potential Impacts and Rationale: Species habitat is likely to benefit from ERP actions to restore 1,700–2,200 acres of riparian habitat within portions of the species' historical range in the San Joaquin Valley and enhance 1,000 acres of stream channel meander corridor in the East San Joaquin Basin EMZ and implement specific measures to assist in achieving species recovery. Restoration of this riparian habitat also contributes to recovery plan goals for this species. No adverse impacts on the species' populations or habitat would be expected.
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors within its current migration and historical nesting range in the MSCS focus area. A portion of restored riparian habitat will be designed specifically to provide suitable species nesting habitat. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. No direct or indirect take of individuals would be expected. Potential adverse impacts could increase if the species were to reestablish nesting territories within the MSCS focus area at or near where CALFED actions would be implemented.
Long-billed curlew <i>Numenius americanus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit primarily from increasing the area and quality of mudflat foraging habitat that would be associated with ERP actions to restore and enhance up to approximately 84,000 acres of tidal and nontidal permanent wetlands within the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. A substantial portion of species habitat in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal emergent habitats.
Long-eared owl <i>Asio otus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to approximately 11,800 acres of potentially suitable riparian nesting habitat and enhance potential foraging and nesting habitat associated with 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats near occupied nesting territories.
Mountain plover <i>Charadrius montanus</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to enhance wildlife habitat values on agricultural lands in the Sacramento-San Joaquin Delta and Yolo Basin EMZs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse effects would most likely be associated with ERP actions to enhance agricultural lands. No adverse impacts on individuals would be expected.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Northern harrier <i>Circus cyaneus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 810,000 acres of potential species nesting and foraging habitat (i.e., permanent and seasonal wetlands, and agricultural) in the MSCS focus area. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species foraging habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. A relatively small portion of species nesting habitat would likely be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance permanent and seasonal wetland habitats near occupied nesting territories.
Northern spotted owl <i>Strix occidentalis caurina</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Osprey <i>Pandion haliaetus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore or enhance riverine foraging habitat (e.g., restoration of up to approximately 11,800 acres of riparian habitat and enhancement of 17,000–25,000 acres of stream channel meander corridors within the MSCS focus area). Construction of new reservoirs would increase the area of suitable foraging habitat and potentially also create suitable nesting habitat area adjacent to new reservoirs. No adverse impacts on the species' populations or habitat would be expected.
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands throughout its current and historical range in the MSCS focus area and implement specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands throughout its current and historical range in the MSCS focus area and implement specific measures to achieve species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Short-eared owl <i>Asio flammeus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 800,000 acres of potential species nesting and foraging habitat (i.e., permanent and seasonal wetlands, and agricultural) within the MSCS focus area. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance permanent and seasonal wetland habitats near occupied nesting territories.
Snowy egret (rookery) <i>Egretta thula</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 845,000 acres of potential species nesting and foraging habitat (i.e., riparian, permanent and seasonal wetlands, and agricultural) within the MSCS focus area. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs, and along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries, could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied rookeries.
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore 7,500–12,000 acres and protect 6,200 acres of saline emergent wetlands throughout its current and historical range in the MSCS focus area and implement specific measures to achieve species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the species' range in the MSCS focus area could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance occupied tidal and nontidal saline emergent habitats.
Swainson's hawk <i>Buteo swainsoni</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 765,000 acres of potential species nesting and foraging habitat (i.e., riparian, seasonal wetland, and agricultural) within the MSCS focus area and implement specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat within the Delta and along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied nesting territories.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Tricolored blackbird <i>Agelaius tricolor</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 810,000 acres of potential species nesting and foraging habitat (i.e., permanent and seasonal wetlands, and agricultural) within the MSCS focus area. A substantial portion of species habitat within the Delta and along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries could be affected. Potential adverse impacts would most likely be associated with implementing ERP actions to restore or enhance riverine, floodplain, and wetland habitats near occupied nesting colonies.
Western burrowing owl [Burrowing owl] <i>Athene cunicularia hypugea</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to restore perennial grassland in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with implementing ERP actions to restore or enhance perennial grasslands, and construction of new surface water and groundwater storage facilities and associated infrastructure near occupied nesting burrows.
Western least bittern <i>Ixobrychus exilis hesperis</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore and enhance up to approximately 421,000 acres of potential species nesting and foraging habitat (i.e., permanent and seasonal wetlands) within the species' historical range in the MSCS focus area. No adverse impacts on the species' populations or habitat would be expected.
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit primarily from increasing the area and quality of mudflat foraging habitat that would be associated with ERP actions to restore and enhance up to approximately 84,000 acres of tidal and nontidal permanent wetlands within the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal and nontidal emergent habitats near occupied nesting areas.
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to at least 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors within its current and historical nesting range in the MSCS focus area and implement specific measures to assist in achieving species recovery. A substantial portion of species habitat within the species' current and historical range in the Sacramento Valley could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats. The likelihood for impacts could increase if the species were to reestablish nesting territories within the MSCS focus area at or near where CALFED actions would be implemented.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
White-faced ibis <i>Plegadis chihi</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 810,000 acres of potential species nesting and foraging habitat (i.e., permanent and seasonal wetlands, and agricultural) within the species' current and historical range in the MSCS focus area. A substantial portion of species habitat within the range of the species in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance wetland habitats near occupied nesting colonies.
White-tailed kite ⁴ <i>Elanus leucurus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 765,000 acres of potential nesting and foraging habitat (i.e., riparian, seasonal wetland, and agricultural) within its current and historical range in the MSCS focus area. A substantial portion of species habitat along and adjacent to the Sacramento and San Joaquin Rivers and their major tributaries could be affected. Potential adverse impacts could most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats near occupied nesting territories.
Yellow-breasted chat <i>Icteria virens</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors within its current and historical nesting range in the MSCS focus area. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats near occupied nesting territories.
Reptiles			
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with enlargement of Los Vaqueros Reservoir.
Blunt-nosed leopard lizard ⁴ <i>Gambelia silus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface and groundwater storage and conveyance facilities within occupied habitat.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Giant garter snake <i>Thamnophis gigas</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 830,000 acres of potential species habitat (i.e., riparian, permanent and seasonal wetlands, and agricultural) throughout much of the species' range within the MSCS focus area and implement specific measures to achieve species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. A substantial portion of species habitat in the Sacramento-San Joaquin Delta and Eastside Delta Tributaries EMZs, and along and adjacent to the Sacramento River and its major tributaries, could be affected over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats and actions to improve conveyance through the Delta in occupied habitat areas.
San Joaquin whipsnake <i>Masticophis flagellum ruddocki</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed within the species' range, the probability of adverse impacts on the species is low. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely only be associated with reservoir enlargement and construction of surface storage reservoirs and conveyance facilities within occupied habitat.
Western pond turtle <i>Clemmys marmorata</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 11,800 acres of riparian habitat and enhance 17,000–25,000 acres of stream channel meander corridors, including areas within its current and historical range in the MSCS focus area. A relatively small portion of the species' habitat within its range could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats in occupied habitat areas.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Amphibians			
California red-legged frog <i>Rana aurora draytonii</i>	m	No	Potential Impacts and Rationale: With implementation of ERP actions to restore and enhance wetland and riparian habitats and stream channel corridors, there is potential for a substantial increase in habitat quantity and quality within historically occupied habitats. The potential for direct species benefits, however, is likely to be minor because most improved habitat areas would not be located near existing source populations and would likely support non-native predator populations. A relatively small portion of occupied species habitat within the species' range could be affected by most actions. A substantial portion of one major population could be affected if Los Vaqueros Reservoir were enlarged. Potential adverse impacts would most likely be associated with implementation of ERP actions near occupied habitat areas or enlargement of Los Vaqueros Reservoir.
California tiger salamander <i>Ambystoma californiense</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to restore and enhance perennial grasslands and vernal pools in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface storage reservoirs and conveyance facilities within occupied habitat.
Foothill yellow-legged frog <i>Rana boylei</i>	m	No	Potential Impacts and Rationale: With implementation of ERP actions to restore and enhance riparian habitats and stream channel corridors, there is potential for a substantial increase in habitat quantity and quality within historically occupied habitats. The potential for direct species benefits, however, is likely to be minor because most improved habitat areas would not be located near existing source populations and would likely support non-native predator populations. A relatively small portion of occupied species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with implementation of ERP actions, reservoir enlargement, and construction of new surface storage facilities near occupied habitat areas.
Limestone salamander ⁴ <i>Hydromantes brunus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Shasta salamander <i>Hydromantes shastae</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. A substantial portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with enlargement of the Shasta Lake reservoir.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Western spadefoot <i>Scaphiopus hammondi</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to restore and enhance perennial grasslands and vernal pools in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs and enhance managed seasonal wetland habitats in the Delta, Sacramento River, and San Joaquin River Regions. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with implementation of ERP actions, construction of enlarged or new surface storage reservoirs, and conveyance facilities within occupied habitat.
Fishes			
Central California Coast steelhead Evolutionarily Significant Unit (ESU) <i>Oncorhynchus mykiss</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with actions to enhance riverine habitats along tributaries to San Pablo Bay. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with implementation of ERP actions to improve riverine habitat conditions in occupied rivers.
Central Valley fall-/late-fall-run chinook salmon ESU <i>Oncorhynchus tshawytscha</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 17,000–25,000 acres of stream channel meander corridors; restore up to 11,800 acres of riparian habitat adjacent to river channels; improve flows for the species; rehabilitate erosional and depositional processes and other ecological processes; restore connectivity with historical floodplains and overflow basins; and implement specific measures to achieve species recovery. Species would also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions, reducing levels of illegal harvest, and improving management of hatchery stocks. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Central Valley spring-run chinook salmon ESU [Spring-run chinook salmon] <i>Oncorhynchus tshawytscha</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 17,000–25,000 acres of stream channel meander corridors; restore up to 11,800 acres of riparian habitat adjacent to river channels; improve flows for the species; rehabilitate erosional and depositional processes and other ecological processes; restore connectivity with historical floodplains and overflow basins; and implement specific measures to achieve species recovery. Species would also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions, reducing levels of illegal harvest, and improving management of hatchery stocks. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.
Central Valley steelhead ESU <i>Oncorhynchus mykiss</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 17,000–25,000 acres of stream channel meander corridors; restore up to 11,800 acres of riparian habitat adjacent to river channels; improve flows for the species; rehabilitate erosional and depositional processes and other ecological processes; restore connectivity with historical floodplains and overflow basins; and implement specific measures to achieve species recovery. Species would also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions, reducing levels of illegal harvest, and improving management of hatchery stocks. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.
Delta smelt <i>Hypomesus transpacificus</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; improve flows for the species; reduce the adverse effects of stressors, such as screening diversions and improving management of flows for the species in the Delta; and implement specific measures to achieve species recovery. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal habitats and improvements to and operation of conveyance facilities.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Green sturgeon <i>Acipenser medirostris</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 17,000–25,000 acres of stream channel meander corridors; restore up to 11,800 acres of riparian habitat adjacent to river channels; and implement specific measures to achieve species recovery. Species could also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions and reducing levels of illegal harvest. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation could affect all life stages throughout most or all of the species' range in the MSCS focus area. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.
Hardhead <i>Mylopharodon conocephalus</i>	m	No	Potential Impacts and Rationale: There is potential for some relatively localized species and species habitat benefit associated with ERP actions to improve riverine habitat conditions. CALFED implementation could affect all life stages along occupied portions of the Sacramento and San Joaquin Rivers and their major tributaries within the MSCS focus area. Potential adverse impacts would most likely be associated with ERP actions to restore and enhance riverine and floodplain habitats.
Longfin smelt <i>Spirinchus thaleichthys</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; improve flows for the species; reduce the adverse effects of stressors, such as screening diversions and improving management of flows for the species in the Delta; and implement specific measures to achieve species recovery. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal habitats and improvements to and operation of conveyance facilities.
McCloud River redband trout <i>Oncorhynchus mykiss</i> ssp. 2	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with enlarging the Shasta Lake reservoir.
Rough sculpin <i>Cottus asperimus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with enlargement of the Shasta Lake reservoir.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Sacramento perch <i>Archoplites interruptus</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore suitable aquatic habitats and reintroduce and establish new populations within the species' historical range. A relatively small portion of the population would be affected by ERP actions that reintroduce and establish new populations.
Sacramento River winter-run chinook salmon ESU [Winter-run chinook salmon] <i>Oncorhynchus tshawytscha</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 16,000–24,000 acres of stream channel meander corridors; restore up to approximately 5,800 acres of riparian habitat along river channels; improve flows for the species; rehabilitate erosional and depositional processes and other ecological processes; restore connectivity with historical floodplains and overflow basins; and implement specific measures to achieve species recovery. Species would also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions, reducing levels of illegal harvest, and improving management of hatchery stocks. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore and enhance up to approximately 64,000 acres of tidal wetlands, shoals, and channel islands; enhance 17,000–25,000 acres of stream channel meander corridors; restore up to 11,800 acres of riparian habitat along river channels; improve flows for the species; rehabilitate erosional and depositional processes and other ecological processes; restore connectivity with historical floodplains and overflow basins; and implement specific measures to achieve species recovery. Species would also likely benefit from ERP actions to reduce the adverse effects of stressors, such as screening diversions. The species' population is expected to increase measurably over the life of CALFED. CALFED implementation would affect all life stages throughout most or all of the species' range. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance tidal, riverine, and floodplain habitats, and construction and improvements to and operation of conveyance facilities.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Tidewater goby <i>Eucyclogobius newberryi</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species and species habitat benefit associated with ERP actions to restore tidal wetlands in the Suisun Marsh/North San Francisco Bay EMZ and that would possibly improve the Bay-Delta aquatic foodweb. A relatively small portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with actions to restore tidal wetlands in occupied habitat areas.
Invertebrates			
California freshwater shrimp ⁵ <i>Syncaris pacifica</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Callippe silverspot ⁵ [Callippe silverspot butterfly] <i>Speyeria callippe callippe</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small species' habitat benefits associated with ERP actions to restore and enhance up to 100 acres of vernal pool habitat and up to 1,000 acres of associated watershed in the Suisun Marsh/North San Francisco Bay EMZ. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage facilities and associated infrastructure.
Delta green ground beetle <i>Elaphrus viridis</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that reintroduce and establish three new populations and restore and enhance up to approximately 100 acres of suitable vernal pool habitat and 1,000 acres of associated watershed adjacent to the only known species population at the Jepson Prairie Preserve. A relatively small portion of the population would likely be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat.
Lange's metalmark ⁵ [Lange's metalmark butterfly] <i>Apodemia mormo langei</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would achieve species recovery plan goals, including restoration and enhancement of up to 100 acres of suitable inland dune scrub habitat within and adjacent to the only known species population. Individuals and habitat could be affected by ERP actions to improve occupied habitat and expand the existing population at Antioch Dunes.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small species habitat benefit associated with ERP actions to restore and enhance up to 100 acres of vernal pool habitat and up to 1,000 acres of associated watershed in the Suisun Marsh/North San Francisco Bay EMZ. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage facilities and associated infrastructure.
Mid-valley fairy shrimp <i>Branchinecta n. sp.</i> "mid-valley"	m	No	Potential Impacts and Rationale: There is potential for relatively small species habitat benefit associated with ERP actions to restore and enhance up to 100 acres of vernal pool habitat and up to 1,000 acres of associated watershed in the Suisun Marsh/North San Francisco Bay EMZ. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage facilities and associated infrastructure.
Monarch butterfly (roost) <i>Danaus plexippus</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species habitat benefit associated with ERP actions that could restore suitable roost habitat within the species' current or historical range. No direct or indirect impacts on individuals would be expected.
Shasta sideband <i>Monadenia troglodytes</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. A substantial portion of species habitat within the species' range could be affected. Potential adverse impacts would most likely be associated with enlargement of the Shasta Lake reservoir.
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to at least 11,800 acres of riparian habitat; improve ecological processes that sustain suitable riparian habitat through enhancement of 17,000–25,000 acres of stream channel meander corridors; increase connectivity among populations; and implement specific measures to achieve species recovery. The species would also benefit from CALFED actions that improve vegetation management for the species on levees. The species' population is expected to increase measurably over the life of CALFED. A substantial portion of species habitat along the Sacramento and San Joaquin Rivers and their major tributaries could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore and enhance riverine and floodplain habitats.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small species habitat benefit associated with ERP actions to restore and enhance up to 100 acres of vernal pool habitat and up to 1,000 acres of associated watershed in the Suisun Marsh/North San Francisco Bay EMZ. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage facilities and associated infrastructure.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small species habitat benefit associated with ERP actions to restore and enhance up to 100 acres of vernal pool habitat and up to 1,000 acres of associated watershed in the Suisun Marsh/North San Francisco Bay EMZ. A relatively small portion of species habitat within the species' range in the MSCS focus area could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage facilities and associated infrastructure.
Plants			
Henderson's bent grass ⁵ <i>Agrostis hendersonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. The probability of adverse effects is low. Potential adverse impacts would likely be associated with construction at proposed storage facilities in Stanislaus and Tehama Counties.
Sharsmith's onion ⁵ <i>Allium sharsmithae</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Rawhide Hill onion <i>Allium tuolumnense</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Sonoma alopecurus ⁵ <i>Alopecurus aequalis</i> var. <i>sonomensis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Large-flowered fiddleneck ⁵ <i>Amsinckia grandiflora</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Dimorphic snapdragon <i>Antirrhinum subcordatum</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama, Glenn, and Colusa Counties.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Mt. Diablo manzanita <i>Arctostaphylos auriculata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Baker's manzanita <i>Arctostaphylos bakeri</i> ssp. <i>bakeri</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Klamath manzanita ⁵ <i>Arctostaphylos klamathensis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Contra Costa manzanita ⁵ <i>Arctostaphylos manzanita</i> ssp. <i>laevigata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Ione manzanita ⁵ <i>Arctostaphylos myrtifolia</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Pallid manzanita <i>Arctostaphylos pallida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Suisun Marsh aster <i>Aster lentus</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would expand the length of occupied habitat along sloughs and channels by 100 miles, protect at least 90% of currently occupied habitat areas, and enhance and restore approximately 64,000 acres of tidal wetlands in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known occurrences of the species' populations and habitat could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat, and actions to improve levee stability and conveyance through the Delta.
Clara Hunt's milk-vetch ⁵ <i>Astragalus clarianus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Big Bear Valley woollypod <i>Astragalus leucolobus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. CALFED actions could affect occurrences in San Benito County. Potential adverse impacts would most likely be associated with construction of a new surface storage reservoir and associated facilities proposed for San Benito County.
Jepson's milk-vetch <i>Astragalus rattanii</i> var. <i>jepsonianus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Glenn County.
Ferris's milk-vetch ⁵ <i>Astragalus tener</i> var. <i>ferrisiae</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would protect extant populations in the MSCS focus area, enhance and restore up to 100 acres of vernal pools and 1,000 acres of associated watershed near the existing Jepson Prairie Preserve population, and establish new populations near extirpated populations. The species' populations and distribution are expected to increase substantially over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat, reservoir enlargement, and construction of new
Heartscale <i>Atriplex cordulata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Brittlescale <i>Atriplex depressa</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface storage reservoirs and associated facilities.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
San Joaquin spearscale [San Joaquin saltbush] <i>Atriplex joaquiniana</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Lesser saltscale ⁵ <i>Atriplex minuscula</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Vernal Pool smallscale <i>Atriplex persistens</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Lost Hills crownscale <i>Atriplex vallicola</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Sonoma sunshine ⁵ <i>Blennosperma bakeri</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Big tarplant <i>Blepharizonia plumosa</i> ssp. <i>plumosa</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Indian Valley brodiaea <i>Brodiaea coronaria</i> ssp. <i>rosea</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama, Glenn, and Colusa Counties.
Chinese Camp brodiaea ⁵ <i>Brodiaea pallida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Mt. Diablo fairy-lantern <i>Calochortus pulchellus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Tiburon Mariposa lily ⁵ <i>Calochortus tiburonensis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Stebbins' morning-glory ⁵ <i>Calystegia stebbinsii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
San Benito evening-primrose <i>Camissonia benitensis</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of a new surface storage reservoir and associated facilities proposed for San Benito County.
Sharsmith's harebell <i>Campanula sharsmithiae</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
White sedge ⁵ <i>Carex albida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Bristly sedge ⁵ <i>Carex comosa</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would that restore up to 19,600 acres of nontidal freshwater emergent wetland in the Sacramento-San Joaquin Delta EMZ and development and implementation of specific measures to assist in achieving species recovery. The species' populations and distribution are expected to increase measurably over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to enhance and restore wetland habitat in the Sacramento-San Joaquin Delta.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Tree-anemone ⁵ <i>Carpenteria californica</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Millerton Lake reservoir.
Tiburon Indian paintbrush ⁵ <i>Castilleja affinis</i> ssp. <i>neglecta</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Succulent owl's-clover <i>Castilleja campestris</i> ssp. <i>succulenta</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Mason's ceanothus ⁵ <i>Ceanothus masonii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Pine Hill ceanothus ⁵ <i>Ceanothus roderickii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Hoover's spurge <i>Chamaesyce hooveri</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Dwarf soaproot <i>Chlorogalum pomeridianum</i> var. <i>minus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama, Glenn, and Colusa Counties.
Sonoma spineflower ⁵ <i>Chorizanthe valida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Slough thistle <i>Cirsium crassicaule</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 6,800 acres of riparian and 19,600 acres of nontidal freshwater permanent emergent wetland habitat in the Sacramento-San Joaquin Delta, Eastside Delta Tributaries, and San Joaquin River EMZs. The species' populations and distribution would be expected to increase measurably over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to enhance habitat along the San Joaquin River.
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would protect and maintain extant populations, establish 10 new populations, increase the population size 10-fold, and enhance and restore up to 18,200 acres of saline emergent wetlands in the Suisun Marsh/North San Francisco Bay EMZ. The species' populations and distribution are expected to increase substantially over the life of CALFED. The only known occurrence on Grizzly Island potentially could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat.
Mariposa clarkia <i>Clarkia biloba</i> ssp. <i>australis</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Shasta clarkia ⁵ <i>Clarkia borealis</i> ssp. <i>arida</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrence, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of the Shasta Lake reservoir.
Beaked clarkia ⁵ <i>Clarkia rostrata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrence, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Point Reyes bird's-beak <i>Cordylanthus maritimus</i> ssp. <i>palustris</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would that would maintain, enhance, and restore high marsh and high marsh-upland transition habitat in conjunction with restoration of up to 5,000 acres of saline emergent wetlands around San Pablo Bay near occupied habitat. The species' populations and distribution are expected to increase measurably over the life of CALFED. No adverse impacts on individuals would be expected.
Soft bird's-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would maintain current distribution and existing populations, enhance and restore up to approximately 18,200 acres of saline emergent wetlands in the Suisun Marsh/North San Francisco Bay EMZ, and establish new populations in enhanced and restored habitats. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat, and actions to improve levee stability and conveyance through the Delta.
Hispid bird's-beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would enhance and restore up to 100 acres of vernal pools and 1,000 acres of associated watershed near the Jepson Prairie Preserve. The species' populations and distribution are expected to increase measurably over the life of CALFED. No adverse impacts on individuals would be expected.
Mt. Diablo bird's-beak ⁵ <i>Cordylanthus nidularius</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Palmate-bracted bird's-beak ⁵ <i>Cordylanthus palmatus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with ERP actions to restore and enhance habitat.
Mt. Hamilton coreopsis <i>Coreopsis hamiltonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Silky cryptantha <i>Cryptantha crinita</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 3,150 acres of riparian habitat in the Cottonwood Creek Basin EMZ and enhance 16,000–24,000 acres of stream channel meander corridor along the Sacramento River. The species' populations and distribution are expected to increase measurably over the life of CALFED. Known species occurrences along Cottonwood Creek and the Sacramento River could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine and floodplain habitats.
Baker's larkspur <i>Delphinium bakeri</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Hospital Canyon larkspur <i>Delphinium californicum</i> ssp. <i>interius</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir and construction of proposed new surface storage reservoirs in Stanislaus County.
Yellow larkspur <i>Delphinium luteum</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Recurved larkspur <i>Delphinium recurvatum</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface storage reservoirs and associated facilities.
Four-angled spikerush <i>Eleocharis quadrangulata</i>	m	No	Potential Impacts and Rationale: There is a potential for relatively small and possibly unmeasurable species habitat benefit associated with ERP actions to improve stream channel meander corridors and enhance seasonal wetlands in the Sacramento Valley. A portion of known species occurrences could be affected, particularly those located in the Sacramento River floodplain and the Butte Basin EMZ. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats in the Sacramento Valley.
Brandege's eriastrum <i>Eriastrum brandegeae</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama and Glenn Counties.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Hoover's eriastrum <i>Eriastrum hooveri</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for the San Joaquin River Region.
Ione buckwheat ⁵ <i>Eriogonum apricum</i> var. <i>apricum</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Irish Hill buckwheat ⁵ <i>Eriogonum apricum</i> var. <i>prostratum</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Ben Lomond buckwheat ⁵ <i>Eriogonum nudum</i> var. <i>decurrens</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Loch Lomond button-celery ⁵ <i>Eryngium constancei</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Delta coyote-thistle [Delta button-celery] <i>Eryngium racemosum</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would restore up to approximately 2,200 acres of riparian habitat in the San Joaquin River and West San Joaquin River Basin EMZs, protect and enhance up to 1,000 acres of stream channel meander corridor in East San Joaquin River Basin EMZ, increase populations and individuals by 25% over present numbers, increasing suitable habitat by at least 50%, and protecting at least 50% of existing populations and individuals. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known species occurrences located along the San Joaquin River and its major tributaries could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and restore or enhance riverine and floodplain habitats.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Spiny-sepaled button-celery <i>Eryngium spinosepalum</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus and Madera Counties.
Contra Costa wallflower <i>Erysimum capitatum</i> ssp. <i>angustatum</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would protect the existing Antioch Dunes' population, enhance 50–100 acres of low quality Antioch Dunes habitat, and achieve USFWS recovery plan goals. The species' populations and distribution are expected to increase measurably over the life of CALFED. A relatively small portion of the population would likely be affected. Potential adverse impacts would be associated with ERP actions to enhance occupied habitat.
Diamond-petaled California poppy ⁵ <i>Eschscholzia rhombipetala</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with enlargement of Los Vaqueros Reservoir and construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Pine Hill flannelbush ⁵ <i>Fremontodendron decumbens</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Adobe-lily <i>Fritillaria pluriflora</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Glenn and Colusa Counties.
El Dorado bedstraw ⁵ <i>Galium californicum</i> ssp. <i>sierrae</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of an isolated facility and associated facilities.
Diablo helianthella <i>Helianthella castanea</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Hall's tarplant ⁵ <i>Hemizonia halliana</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. A portion of occurrences or historically recorded occurrence sites could be affected by proposed surface storage in San Benito County.
Congdon's tarplant <i>Hemizonia parryi</i> ssp. <i>congdonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Brewer's western flax <i>Hesperolinon breweri</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Marin western flax <i>Hesperolinon congestum</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Drymaria-like western flax <i>Hesperolinon drymarioides</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Glenn and Colusa Counties.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Napa western flax <i>Hesperolinon serpentinum</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Glenn, Colusa, and Stanislaus Counties.
Tehama County western flax ⁵ <i>Hesperolinon tehamense</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama and Glenn Counties.
Rose-mallow <i>Hibiscus lasiocarpus</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 65,000 acres of tidal and nontidal freshwater emergent wetland in the Sacramento-San Joaquin Delta EMZ and enhance up to approximately 24,000 acres of stream channel meander corridor along the Sacramento River. The species' populations and distribution would be expected to increase measurably over the life of CALFED. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance wetland and floodplain habitats, and actions to improve levee stability and conveyance through the Delta.
Santa Cruz tarplant <i>Holocarpha macradenia</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Parry's horkelia ⁵ <i>Horkelia parryi</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Carquinez goldenbush <i>Isocoma arguta</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions to restore and enhance up to 100 acres of vernal pools and 1,000 acres of associated watershed near the Jepson Prairie Preserve. The species' populations and distribution are expected to increase measurably over the life of CALFED. Occurrences in Solano County could be affected. Potential adverse impacts would most likely be associated with ERP actions to enhance and restore occupied habitat.
Northern California black walnut (native stands) <i>Juglans hindsii</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would protect existing stands and establish 5–10 additional self-sustaining populations. A portion of known native stands could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Ahart's dwarf rush ⁵ <i>Juncus leiospermus</i> var. <i>ahartii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Contra Costa goldfields ⁵ <i>Lasthenia conjugens</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions to restore and enhance up to 100 acres of vernal pools and 1,000 acres of associated watershed near the Jepson Prairie Preserve. The species' populations and distribution are expected to increase measurably over the life of CALFED. No adverse impacts on individuals would be expected.
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would expand the length of occupied habitat along sloughs and channels by 100 miles, protect at least 90% of currently occupied habitat areas, and enhance and restore approximately 64,000 acres of tidal wetlands in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat, and actions to improve levee stability and conveyance through the Delta.
Pale-yellow layia ⁵ <i>Layia heterotricha</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the construction of proposed surface storage reservoirs in San Benito County.
Legenere <i>Legenere limosa</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
San Joaquin woollythreads <i>Lembertia congdonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with reservoir enlargement and construction of new surface storage reservoirs and associated facilities in the San Joaquin Valley.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Panoche pepper-grass <i>Lepidium jaredii</i> ssp. <i>album</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of surface storage reservoirs and associated facilities proposed for San Benito and Madera Counties.
Heckard's pepper-grass ⁵ <i>Lepidium latipes</i> var. <i>heckardii</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions to restore and enhance up to 100 acres of vernal pools and 1,000 acres of associated watershed near the Jepson Prairie Preserve. The species' populations and distribution are expected to increase measurably over the life of CALFED. A relatively small portion of occurrences would likely be affected. Potential adverse impacts would most likely be associated with ERP actions to enhance and restore occupied habitat.
Saw-toothed lewisia <i>Lewisia serrata</i>	m	No	Potential Impacts and Rationale: There is potential for relatively small and possibly unmeasurable species habitat benefit associated with actions to improve riparian habitat and stream channel meander corridors in the American River Basin and Feather River/Sutter Basin EMZs. No adverse impacts on individuals would be expected.
Pitkin Marsh lily ⁵ <i>Lilium pardalinum</i> ssp. <i>pitkinense</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Mason's lilaeopsis <i>Lilaeopsis masonii</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would expand the length of occupied habitat along sloughs and channels by 100 miles, protect at least 90% of currently occupied habitat areas, and enhance and restore approximately 63,000 acres of tidal wetlands in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat; actions to improve levee stability and conveyance through the Delta; and with construction of proposed surface storage reservoirs in the Delta.
Bellinger's meadowfoam ⁵ <i>Limnanthes floccosa</i> ssp. <i>bellingeriana</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences and habitat, the potential for adverse effects is low. Potential adverse impacts would most likely be associated with the proposed enlargement of the Shasta Lake reservoir.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Butte County meadowfoam ⁵ <i>Limnanthes floccosa</i> ssp. <i>californica</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Sebastopol meadowfoam ⁵ <i>Limnanthes vinculans</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Delta mudwort <i>Limosella subulata</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would expand the length of occupied habitat along sloughs and channels by 100 miles, protect at least 90% of currently occupied habitat areas, and enhance and restore approximately 64,000 acres of tidal wetlands in the Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay EMZs. The species' populations and distribution are expected to increase substantially over the life of CALFED. A substantial portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with ERP actions to establish new populations and enhance occupied habitat; actions to improve levee stability and conveyance through the Delta; and construction of proposed surface storage reservoirs in the Delta.
Mt. Tedoc linanthus ⁵ <i>Linanthus nuttallii</i> ssp. <i>howellii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Madera linanthus <i>Linanthus serrulatus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. A relatively small portion of known species occurrences could be affected. Potential adverse impacts would most likely be associated with enlargement of Millerton Lake reservoir in Madera County.
Congdon's lomatium <i>Lomatium congdonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Red-flowered lotus ⁵ <i>Lotus rubriflorus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Shaggyhair lupine <i>Lupinus spectabilis</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Showy madia <i>Madia radiata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir and construction of proposed new surface storage reservoirs in Stanislaus County.
Hall's bush mallow <i>Malacothamnus hallii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
San Antonio Hills monardella <i>Monardella antonina</i> ssp. <i>antonina</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for the San Joaquin River Region.
Few-flowered navarretia ⁵ <i>Navarretia leucocephala</i> ssp. <i>pauciflora</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Many-flowered navarretia ⁵ <i>Navarretia leucocephala</i> ssp. <i>plieantha</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Pincushion navarretia ⁵ <i>Navarretia myersii</i> ssp. <i>myersii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Colusa grass <i>Neostapfia colusana</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions to restore and enhance up to 100 acres of vernal pools and 1,000 acres of associated watershed near the Jepson Prairie Preserve. The species' populations and distribution are expected to increase measurably over the life of CALFED. No adverse impacts on individuals would be expected.
Shasta snow-wreath ⁵ <i>Neviusia cliffonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse effects would most likely be associated with the proposed enlargement of the Shasta Lake reservoir.
Antioch Dunes evening-primrose <i>Oenothera deltooides</i> ssp. <i>howellii</i>	R	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that would protect the existing Antioch Dunes' population, enhance 50–100 acres of low-quality Antioch Dunes habitat, and achieve USFWS recovery plan goals. The species' populations and distribution are expected to increase measurably over the life of CALFED. A relatively small portion of the population would likely be affected. Potential adverse impacts would most likely be associated with ERP actions to enhance occupied habitat.
San Joaquin Valley orcutt grass ⁵ <i>Orcuttia inaequalis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Hairy orcutt grass ⁵ <i>Orcuttia pilosa</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Slender orcutt grass <i>Orcuttia tenuis</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities.
Sacramento orcutt grass ⁵ <i>Orcuttia viscida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Ahart's paronychia <i>Paronychia ahartii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new surface or groundwater storage and associated facilities.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Thread-leaved beardtongue <i>Penstemon filiformis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
White-rayed pentachaeta ⁵ <i>Pentachaeta bellidiflora</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Merced phacelia <i>Phacelia ciliata</i> var. <i>opaca</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Mt. Diablo phacelia ⁵ <i>Phacelia phacelioides</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus and San Benito Counties.
Calistoga popcorn-flower ⁵ <i>Plagiobothrys strictus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
North Coast semaphore grass ⁵ <i>Pleuropogon hooverianus</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Napa blue grass ⁵ <i>Poa napensis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Marin knotweed ⁵ <i>Polygonum marinense</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would that would maintain, enhance, and restore up to 5,000 acres of saline emergent wetlands around San Pablo Bay near occupied habitat. The species' populations and distribution are expected to increase measurably over the life of CALFED. No adverse impacts on individuals would be expected.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Eel-grass pondweed ⁵ <i>Potamogeton zosteriformis</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to 19,600 acres of nontidal freshwater emergent wetland in the Sacramento-San Joaquin Delta EMZ. The species' populations and distribution are expected to increase measurably over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to enhance and restore wetlands in the Sacramento-San Joaquin Delta.
Hartweg's golden sunburst <i>Pseudobahia bahiifolia</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with construction of new storage facilities proposed for Sutter, Stanislaus, and Madera Counties.
San Joaquin adobe sunburst <i>Pseudobahia peirsonii</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
California beaked-rush ⁵ <i>Rhynchospora californica</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Sanford's arrowhead <i>Sagittaria sanfordii</i>	m	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to benefit from ERP actions that would restore up to approximately 19,600 acres of nontidal freshwater permanent emergent wetland habitat in the Sacramento-San Joaquin Delta EMZ and enhance up to approximately 25,000 acres of stream channel meander corridor in the Sacramento River and San Joaquin River Regions. The species' populations and distribution are expected to increase measurably over the life of CALFED. A portion of known species occurrences could be affected, particularly those located in the Sacramento-San Joaquin Delta EMZ and within the floodplains of the Sacramento and San Joaquin Rivers and their major tributaries. Potential adverse impacts would most likely be associated with ERP actions to restore or enhance riverine, floodplain, and wetland habitats, and actions to improve levee stability and conveyance through the Delta.
Rock sanicle <i>Sanicula saxatilis</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Marsh skullcap <i>Scutellaria galericulata</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is assessed as moderate. Known species occurrences in the Sacramento-San Joaquin Delta EMZ could be affected. Known species occurrences elsewhere are unlikely to be affected by CALFED. Potential adverse impacts would most likely be associated with ERP actions to enhance and restore wetlands, and actions to improve levee stability and conveyance through the Delta.
Mad-dog skullcap ⁵ [Blue skullcap] <i>Scutellaria lateriflora</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Red Hills ragwort ⁵ <i>Senecio clevelandii</i> var. <i>heterophyllus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Layne's ragwort ⁵ <i>Senecio layneae</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Marin checkerbloom ⁵ <i>Sidalcea hickmanii</i> ssp. <i>viridis</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>hydrophila</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Tehama, Glenn, and Colusa Counties.
Kenwood Marsh checkerbloom ⁵ <i>Sidalcea oregana</i> ssp. <i>valida</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
English peak greenbriar <i>Smilax jamesii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of the Shasta Lake reservoir.
Most beautiful jewel-flower <i>Streptanthus albidus</i> ssp. <i>peramoenus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir, and the in-Delta storage project.
Mt. Hamilton jewel-flower ⁵ <i>Streptanthus callistus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Mt. Diablo jewel-flower <i>Streptanthus hispidus</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with the proposed enlargement of Los Vaqueros Reservoir.
Arburua Ranch jewel-flower <i>Streptanthus insignis</i> ssp. <i>lyonii</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.
Tiburon jewel-flower ⁵ <i>Streptanthus niger</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
California seablite ⁵ <i>Suaeda californica</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Showy Indian clover <i>Trifolium amoenum</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.

Table A-1. Continued

MSCS Evaluated Species ¹	MSCS Species Goal	NCCP Covered ²	Potential Impacts and Rationale for Including or Excluding Species as Covered Species ³
Greene's tuctoria ⁵ <i>Tuctoria greenei</i>	m	No	Potential Impacts and Rationale: The species' populations and habitat are unlikely to be affected by CALFED actions.
Crampton's tuctoria ⁵ <i>Tuctoria mucronata</i>	r	Yes	Potential Impacts and Rationale: The species' populations and habitat are likely to substantially benefit from ERP actions that reintroduce and establish three new populations and restore and enhance up to approximately 100 acres of suitable vernal pool habitat and 1,000 acres of associated watershed adjacent to the Jepson Prairie Preserve. The species' populations and distribution are expected to increase substantially over the life of CALFED. Potential adverse impacts would most likely be associated with ERP actions to expand the species' populations and improve occupied habitat.
California vervain ⁵ <i>Verbena californica</i>	m	No	Potential Impacts and Rationale: The proposed ERP actions are not likely to provide a measurable benefit to the species. Based on the number and types of actions proposed near known species occurrences, the probability of adverse effects on the species is low. No known species occurrences would likely be affected. Potential adverse impacts would most likely be associated with construction of new surface storage reservoirs and associated facilities proposed for Stanislaus County.

Table A-1. Continued

Notes:

- ¹ CDFG common name designations shown in brackets.
- ² Covered species determinations were made using the assumption that all proposed CALFED actions evaluated in the MSCS and MSCS conservation measures will be implemented and that all impacts on species will be fully mitigated. The potential for impacts on species was determined by comparing the known and potential distribution of each species to locations where CALFED actions could be implemented. CALFED was assumed to have beneficial effects on a species if CALFED actions would directly benefit the species (e.g., establishing new species' populations) or would improve or restore suitable species habitat in locations where the species is present or where the species could colonize the improved or restored habitat.
- ³ All habitat and species protection, enhancement, and restoration quantities cited in this table are from Volume II of the Ecosystem Restoration Program Plan (CALFED 2000). Habitat enhancement and restoration quantities are summarized by CALFED region in Table A-2.
- ⁴ This species is fully protected by the State of California. The California Department of Fish and Game (CDFG) is prohibited from issuing permits for incidental take of fully protected species.
- ⁵ CALFED actions must avoid direct mortality of the species (see MSCS Table 4-5). Project modifications could be necessary to avoid direct mortality.

Acronyms

CALFED	CALFED Bay-Delta Program
CDFG	California Department of Fish and Game
EMZ	ERP ecological management zone
ERP	Ecosystem Restoration Program
MSCS	Multi-Species Conservation Strategy
NCCP	Natural Community Conservation Plan

Citation

CALFED Bay-Delta Program. 2000. Ecosystem Restoration Program Plan, Volume II – Ecological Management Zone Visions. July. Sacramento, CA.

Table A-2. Summary of Natural Community Conservation Plan Habitat Acres to be Protected, Enhanced, or Restored under the Ecosystem Restoration Program

NCCP Habitat or Habitat Feature	CALFED Region							
	Delta		Bay		Sacramento River		San Joaquin River	
	Protected or Enhanced	Restored	Protected or Enhanced	Restored	Protected or Enhanced	Restored	Protected or Enhanced	Restored
Tidal perennial aquatic	0	7,500 ¹	0	1,500	0	0	0	0
Lacustrine	0	0	0	1,600	0	0	0	0
Saline emergent	0	0	6,200	7,500-12,000	0	0	0	0
Tidal freshwater emergent ²	0	30,200-45,800	0	0	0	0	0	0
Nontidal freshwater permanent emergent	0	19,600 ³	0	0	0	0	0	0
Managed seasonal wetland ⁴	4,000	28,000	58,000	1,000-1,500	73,325	0	172,800	0
Natural seasonal wetland ⁵	0	0	600-1,000 ⁶	0	0	0	0	0
Valley foothill riparian and montane riparian ⁷	0	1,284-1,922	0	200-300	16,000-24,000 ⁸	3,635	1,000 ⁸	5,432-5,932
Grassland ⁹	0	4,000-6,000	0	5,000	0	0	0	0 ¹⁰
Inland dune scrub	50-100	0	0	0	0	0	0	0
Seasonally flooded agriculture and upland cropland ¹¹	40,000-75,000	0	0	0	298,643	0	15,290	0
Tidal and delta sloughs ¹²	0	395-970	0	213-423	0	303-606	0	0

Table A-2. Continued

Notes:

- ¹ Includes 500 acres of Ecosystem Restoration Program (ERP) designated shoal habitat.
- ² Includes 200-800 acres of ERP designated channel island habitat.
- ³ Includes 2,600 acres of ERP designated nontidal perennial aquatic habitat (i.e., Multi-Species Conservation Strategy [MSCS] designated lacustrine).
- ⁴ Designated as seasonal wetlands in the ERP.
- ⁵ Designated as vernal pools in the ERP.
- ⁶ Includes 100 acres of ERP designated vernal pool habitat and 500-1,000 acres of adjacent buffer lands.
- ⁷ Designated as riparian and riverine aquatic in the ERP. The ERP plan identifies miles of streamside riparian habitat to be restored. Acreages of restored habitat are estimates developed by CALFED from miles of restored habitat identified in the ERP plan.
- ⁸ Designated as the ecological process stream channel meander in the ERP. The ERP plan identifies miles of stream channel meander corridors along channels to be protected and enhanced. Acreages of protected and enhanced stream channel meander corridors are estimates developed by CALFED from miles of stream channel meander corridors identified as being protected or enhanced in the ERP plan. It is assumed that protection and enhancement of stream channel meander corridors will result in protection and enhancement of existing riparian habitat and will restore the processes that will allow natural reestablishment of riparian habitat.
- ⁹ Designated perennial grassland in the ERP.
- ¹⁰ The ERP identifies restoration of an unspecified amount of grassland in association with enhancement of seasonal wetlands in the Sacramento River Region.
- ¹¹ Designated as agricultural lands in the ERP.
- ¹² This ERP designated habitat is assumed to result in restoration of MSCS tidal perennial aquatic, saline emergent, tidal freshwater emergent, and valley/foothill riparian habitats. The extent of each of the MSCS habitats that would be restored is not estimated.

Acronyms:

ERP = Ecosystem Restoration Program

Table A-2. Continued

MSCS = Multi-Species Conservation Strategy
NCCP = Natural Community Conservation Plan

Sources:

CALFED Bay-Delta Program. Ecosystem Restoration Program Plan, Volume II– Ecological Management Zone Visions. Technical Appendix, Final Programmatic Environmental Impact Statement/Environmental Impact Report, July 2000. Sacramento, CA.

Mills, Terry. CALFED Ecosystem Restoration Program coordinator. Unpublished memorandum.

Table A-3. CALFED NCCP Covered Species

Common Name and Scientific Name	Status ¹		MSCS Species Goal ²
	State	Federal	
Mammals			
Ringtail <i>Bassariscus astutus</i>	–	–	m
Riparian brush rabbit <i>Sylvilagus bachmani riparius</i>	CE	E	r
Salt-marsh harvest mouse <i>Reithrodontomys raviventris</i>	CE	E	r
San Joaquin Valley woodrat [Riparian woodrat] <i>Neotoma fuscipes riparia</i>	–	E	r
San Pablo California vole [San Pablo vole] <i>Microtus californicus sanpabloensis</i>	–	–	r
Suisun ornate shrew [Suisun shrew] <i>Sorex ornatus sinuosus</i>	–	–	R
Birds			
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	–	T	m
American peregrine falcon <i>Falco peregrinus anatum</i>	CE	–	m
Bald eagle <i>Haliaeetus leucocephalus</i>	CE	T	m
Bank swallow <i>Riparia riparia</i>	CT	–	r
Black-crowned night heron (rookery) <i>Nycticorax nycticorax</i>	–	–	m
Black tern <i>Chlidonias niger</i>	–	–	m
California black rail <i>Laterallus jamaicensis coturniculus</i>	CT	–	r
California clapper rail <i>Rallus longirostris obsoletus</i>	CE	E	r
California gull <i>Larus californicus</i>	–	–	m
California yellow warbler [Yellow warbler] <i>Dendroica petechia brewsteri</i>	–	–	r
Cooper's hawk <i>Accipiter cooperi</i>	–	–	m
Double-crested cormorant (rookery) <i>Phalacrocorax auritus</i>	–	–	m
Great blue heron (rookery) <i>Ardea herodias</i>	–	–	m

Table A-3. CALFED NCCP Covered Species

Common Name and Scientific Name	Status ¹		MSCS Species Goal ²
	State	Federal	
Birds Continued			
Great egret (rookery) <i>Ardea albus</i>	–	–	m
Greater sandhill crane <i>Grus canadensis tabida</i>	CT	–	r
Least Bell's vireo <i>Vireo bellii pusillus</i>	CE	E	r
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	CE	–	r
Long-billed curlew <i>Numenius americanus</i>	–	–	m
Long-eared owl <i>Asio otus</i>	–	–	m
Northern harrier <i>Circus cyaneus</i>	–	–	m
Osprey <i>Pandion haliaetus</i>	–	–	m
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	–	–	r
San Pablo song sparrow [Samuel's song sparrow] <i>Melospiza melodia samuelis</i>	–	–	R
Short-eared owl <i>Asio flammeus</i>	–	–	m
Snowy egret (rookery) <i>Egretta thula</i>	–	–	m
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	–	–	R
Swainson's hawk <i>Buteo swainsoni</i>	CT	–	r
Tricolored blackbird <i>Agelaius tricolor</i>	–	–	m
Western least bittern <i>Ixobrychus exilis hesperis</i>	–	–	m
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	–	T	m
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	CE	–	r
White-faced ibis <i>Plegadis chihi</i>	–	–	m

Table A-3. CALFED NCCP Covered Species

Common Name and Scientific Name	Status ¹		MSCS Species Goal ²
	State	Federal	
Birds Continued			
White-tailed kite <i>Elanus leucurus</i>	–	–	m
Yellow-breasted chat <i>Icteria virens</i>	–	–	m
Reptiles			
Giant garter snake <i>Thamnophis gigas</i>	CT	T	r
Western pond turtle <i>Clemmys marmorata</i>	–	–	m
Fishes			
Central Valley fall-/late-fall-run chinook salmon evolutionarily significant unit (ESU) <i>Oncorhynchus tshawytscha</i>	–	C	R
Central Valley spring-run chinook salmon ESU [Spring-run chinook salmon] <i>Oncorhynchus tshawytscha</i>	CT	T	R
Central Valley steelhead ESU <i>Oncorhynchus mykiss</i>	–	T	R
Delta smelt <i>Hypomesus transpacificus</i>	CT	T	R
Green sturgeon <i>Acipenser medirostris</i>	–	–	R
Longfin smelt <i>Spirinchus thaleichthys</i>	–	–	R
Sacramento perch <i>Archoplites interruptus</i>	–	–	r
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	–	T	R
Sacramento River winter-run chinook salmon ESU [Winter-run chinook salmon] <i>Oncorhynchus tshawytscha</i>	CE	E	R
Invertebrates			
Delta green ground beetle <i>Elaphrus viridis</i>	–	T	r
Lange's metalmark [Lange's metalmark butterfly] <i>Apodemis mormo langei</i>	–	E	R
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	–	T	R

Table A-3. CALFED NCCP Covered Species

Common Name and Scientific Name	Status ¹		MSCS Species Goal ²
	State	Federal	
Plants			
Suisun Marsh aster <i>Aster lentus</i>	–	–	R
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	–	–	r
Bristly sedge <i>Carex comosa</i>	–	–	r
Slough thistle <i>Cirsium crassicaule</i>	–	–	m
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	–	E	R
Point Reyes bird's-beak <i>Cordylanthus maritimus</i> ssp. <i>palustris</i>	–	–	r
Soft bird's-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	R	E	R
Hispid bird's-beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	–	–	m
Silky cryptantha <i>Cryptantha crinita</i>	–	–	m
Delta coyote-thistle [Delta button-celery] <i>Eryngium racemosum</i>	CE	–	r
Contra Costa wallflower <i>Erysimum capitatum</i> ssp. <i>angustatum</i>	CE	E	R
Rose-mallow <i>Hibiscus lasiocarpus</i>	–	–	m
Carquinez goldenbush <i>Isocoma arguta</i>	–	–	m
Northern California black walnut (native stands) <i>Juglans hindsii</i>	–	–	r
Contra Costa goldfields <i>Lasthenia conjugens</i>	–	E	m
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	–	–	r
Heckard's pepper-grass <i>Lepidium latipes</i> var. <i>heckardii</i>	–	–	m
Mason's lilaeopsis <i>Lilaeopsis masonii</i>	R	–	R

Common Name and Scientific Name	Status ¹		MSCS Species Goal ²
	State	Federal	
Plants Continued			
Delta mudwort <i>Limosella subulata</i>			r
Colusa grass <i>Neostapfia colusana</i>	CE	T	m
Antioch Dunes evening-primrose <i>Oenothera deltoides</i> ssp. <i>howellii</i>	CE	E	R
Marin knotweed <i>Polygonum marinense</i>	–	–	m
Eel-grass pondweed <i>Potamogeton zosteriformis</i>	–	–	m
Sanford’s arrowhead <i>Sagittaria sanfordii</i>	–	–	m
Crampton’s tuctoria [Solano grass] <i>Tuctoria mucronata</i>	CE	E	r

Note: California Department of Fish and Game common name designations shown in brackets.

¹Status:

Federal

- E = Listed as endangered under the federal Endangered Species Act (FESA).
- T = Listed as threatened under FESA.
- C = Candidate for listing under FESA.

State

- CE = Listed as endangered under the California Endangered Species Act (CESA).
- CT = Listed as threatened under CESA.
- R = Listed as rare under California Native Plant Protection Act.

California Native Plant Society (CNPS)

- 1B = CNPS List 1B.
- 2 = CNPS List 2.
- 3 = CNPS List 3.

² **MSCS Species Goals:**

- R = Recovery. Recover species’ populations within the MSCS focus area to levels that ensure the species’ long-term survival in nature.
- r = Contribute to recovery. Implement some of the actions deemed necessary to recover species’ populations within the MSCS focus area.
- m = Maintain. Ensure that any adverse effects on the species that could be associated with implementation of CALFED actions will be fully offset through implementation of actions beneficial to the species.

Table A-4. CALFED MSCS-ERP Milestones

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Delta and East Side Tributaries		
<u>Ecological Processes</u>		
Develop a methodology for evaluating delta flow and hydrodynamic patterns and begin implementation of an ecologically based plan to restore conditions in the rivers and sloughs of the Delta sufficient to support targets for the restoration of aquatic resources.	Bay-Delta Hydrodynamics	Central Valley chinook salmon and steelhead, green sturgeon, delta smelt, longfin smelt, and Sacramento splittail
Develop and implement temperature management programs within major tributaries in the Eastside Delta Tributaries EMZ. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.	Central Valley Stream Temperatures	Central Valley fall/late fall-run chinook salmon and steelhead
Provide a fall or early winter outflow that emulates the first "winter" rain through the Delta.	Central Valley Streamflow	all Central Valley salmonids
Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within the Eastside Delta Tributaries EMZ.	Coarse Sediment Supply	all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Norther California black walnut

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within the Eastside Delta Tributary EMZ.	Natural Floodplain and Flood Processes	all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut
<u>Habitats</u>		
In the Sacramento-San Joaquin Delta EMZ, cooperatively enhance at least 15% of the ERP target for wildlife friendly agricultural practices.	Agricultural Lands	greater sandhill crane, giant garter snake, Swainson’s hawk
Restore a minimum of 15 miles of slough habitat (widths less than 50 to 75 feet) in each of the North, East, South, Central and West Delta EMUs that allows for the colonization of delta mudwort and delta tule pea.	Delta Sloughs	all Central Valley salmonids, delta smelt, Sacramento splittail, Sacramento perch, giant garter snake, delta mudwort, delta tule pea
Restore a minimum of 500, 250, 1,000, and 2,500 acres of nontidal emergent wetland in the North, East, South, and Central and West Delta Ecological Management units respectively. Establish at least one population of bristly sedge in each EMU.	Fresh Emergent Wetland (nontidal)	giant garter snake, California black rail, bristly sedge
Restore a minimum of 500, 500, 4,000, and 5,000 acres of tidal emergent wetland in the North, East, South, and Central and West Delta Ecological Management units respectively.	Fresh Emergent Wetland (tidal)	all Central Valley salmonids, green sturgeon, longfin smelt, delta smelt, Sacramento splittail, California black rail, Mason’s lilaeopsis, delta mudwort, delta tule pea
Conduct surveys to locate potential habitat restoration sites capable of supporting Antioch dunes evening primrose, Contra Costa wallflower, and Lange’s metalmark butterfly. Enhance 50 acres of low to moderate quality Antioch inland dune scrub habitat to support these species. Annually monitor establishment success.	Inland Dune Scrub	Lange’s metalmark butterfly, Antioch dunes evening primrose, Contra Costa wallflower

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Restore a minimum of 125 acres of channel islands and 125 acres of shoals in the Delta.	Midchannel Islands and Shoals	all Central Valley salmonids, Sacramento splittail, delta smelt, black rail
Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat, and instream cover along at least one tributary within the Eastside Delta Tributary EMZ	Riparian and Riverine Aquatic Habitats	Central Valley steelhead, fall/late fall-run chinook salmon, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher, delta coyote thistle
Implement 25 percent of the ERP target for diverse, self-sustaining riparian community for each EMU in the Sacramento-San Joaquin Delta EMZ.	Riparian and Riverine Aquatic Habitats	Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, little willow flycatcher, California yellow warbler
Restore a minimum of 300 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River, Cosumnes River, and Calaveras River and protect existing riparian habitat.	Riparian and Riverine Aquatic Habitats	Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, little willow flycatcher, California yellow warbler, Valley elderberry long-horn beetle
Enhance, protect and restore 1,000 to 1,500 acres of seasonal wetlands in the East Delta EMU for optimum greater sandhill crane habitat.	Seasonal Wetlands	greater sandhill crane, Swainson’s hawk
Restore a minimum of 500, 250, 500, and 750 acres of tidal perennial aquatic habitat in the North, East, South, and Central and West Delta Ecological Management units respectively.	Tidal Perennial Aquatic Habitat	all Central Valley salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon
<u>Stressors Reduction</u>		
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within Eastside Delta tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon, green sturgeon, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Provide unimpeded upstream and downstream passage for salmon and steelhead on Eastside Delta tributaries.	Dams and Other Structures	all Central Valley salmonids
Assist in the development and implementation of a black and clapper rail impact reduction program.	Disturbance	California black rail, California clapper rail
Develop and begin implementation of a program to reduce or eliminate the influx of non-native aquatic species in ship ballast water.	Invasive Aquatic Organisms	all covered fish species
Complete installation of fish passage facilities at Bellota Weir, Clements Dam, and Cherryland Dam on the Calaveras River and provide passage flows.	Dams and Other Structures	Central Valley fall/late fall-run chinook salmon and steelhead
Develop and begin implementation of a demonstration program to reduce invasive non-native plant abundance within at least one EMU in the Delta.	Invasive Aquatic Plants	Susiun Marsh aster, Mason’s lilaeopsis, delta mudwort, delta tule pea
Implement a program to improve fish passage and reduce predation on juvenile salmonids below Woodbridge Dam on the lower Mokelumne River that includes the following elements: (1) improving the form and function of the stream channel; (2) rebuilding the Woodbridge Dam fish passage and diversion screening facilities to minimize losses of downstream migrating salmon and steelhead; and (3) improving the fish bypass discharge.	Predation and Competition	Central Valley fall/late fall-run chinook salmon, steelhead
Consolidate and screen 50 small agricultural diversions in the Delta, prioritized according to size, location, and season of operation.	Water Diversions	all R and r covered fish
Upgrade screens at Southern Energy’s Contra Costa power plants with screens acceptable to the Fish and Wildlife Agencies.	Water Diversions	all R and r covered fish

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate low dissolved oxygen conditions (DO sag) in lower San Joaquin River near Stockton (from Phase II Report):</p> <ul style="list-style-type: none"> • Complete studies of causes for DO sag in San Joaquin River near Stockton. • Define and implement corrective measures for DO sag. • Finalization of investigation of methods to reduce constituents that cause low DO for inclusion in total maximum daily load (TMDL) recommendation by the Central Valley RWQCB. • Finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River. • Implement appropriate source and other controls and other management practices, as recommended in the TMDL, to reduce anthropogenic oxygen depleting substances loadings and minimize or eliminate low DO conditions. 	<p>dissolved oxygen, oxygen depleting substances, nutrients, total organic carbon (TOC)</p>	<p>Salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon</p>
<p>Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)</p>	<p>oxygen depleting substances, nutrients, TOC, ammonia</p>	<p>Salmonids, Sacramento splittail</p>
<p>Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)</p>	<p>dissolved oxygen, oxygen depleting substances, nutrients</p>	<p>Salmonids, Sacramento splittail</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
<p>Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.</p>	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following mercury evaluation and abatement work in the Cache Creek watershed (from Phase II Report):</p> <ul style="list-style-type: none"> • Support development and implementation of TMDL for mercury. • Determine bioaccumulation effects in creek and Delta. • Source, transport, inventory, mapping and speciation of mercury. • Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate. • Determine sources of high levels of bioavailable mercury 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake
<p>Conduct the following mercury evaluation and abatement work in the Delta (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine methylation (part of bioaccumulation) process in Delta. • Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work. • Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms. 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	<p>carbofurans, chloropyrifos, diazinon</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.</p>
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	<p>selenium</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail</p>
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	<p>chlorodane, DDT, PCBs, toxaphene</p>	<p>Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Conduct the following trace metals work (from Phase II Report): <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
Conduct the following unknown toxicity work (from Phase II Report): <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
Suisun Marsh and North San Francisco Bay		
<u>Habitats</u>		
Restore and maintain a minimum of three linear miles of riparian habitat along corridors of existing riparian scrub and shrub vegetation in each of the Ecological Management Units of the Suisun Marsh/North San Francisco Bay Ecological Management Zone.	Riparian and Riverine Aquatic Habitats	Sacramento splittail, all Central Valley salmonids, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>In the Suisun Marsh/North San Francisco Bay EMZ, restore a minimum of 7,000 acres of Saline Emergent Wetland by restoring tidal action in the Suisun Bay and Marsh Ecological Management Unit (including 200 acres of muted tidal marsh along the Contra Costa shoreline) and a cumulative total of 1,000 acres in the Napa River, Sonoma Creek, Petaluma River, and San Pablo Bay Ecological Management Units. Restore high marsh and high-marsh upland transition habitat in conjunction with restoration of saline emergent wetland. Develop cooperative programs to acquire, in fee-title or through a conservation easement, the land needed for tidal restoration, and complete the needed steps to restore the wetlands to tidal action. Begin aggressive program of control of non-native plant species that are threatening the known populations of Suisun thistle, Suisun Marsh aster, soft bird’s beak, and Point Reyes bird’s beak.</p> <ul style="list-style-type: none"> - Bring into protection at least 25% of currently occupied, but unprotected Suisun Marsh aster habitat, spread throughout the North, East, South Delta and Napa River Ecological Units, and ensure appropriate management. -Expand suitable tidal slough habitat for Suisun Marsh aster by 25 linear miles. -Identify at least three protected and managed sites for introduction of at least three additional populations of Suisun thistle; increase overall population size at least threefold. -Establish at least one new population of soft bird’s beak with high likelihood of success in restored habitat in each of the Suisun Bay and Marsh EMU, the Napa River EMU, and the Petaluma River EMU. -Establish at least one new Point Reyes bird’s beak population in the Petaluma River and San Pablo Bay EMUs. 	<p>Saline Emergent Wetland</p>	<p>All Central Valley salmonids, delta smelt, longfin smelt, Sacramento splittail, Suisun song sparrow, San Pablo song sparrow, California Clapper rail, California black rail, Suisun thistle, soft bird’s beak, Point Reyes bird’s-beak, salt marsh harvest mouse, Suisun ornate shrew, San Pablo California vole, Suisun aster, salt marsh common yellow throat</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Restore suitable, occupied slough edge habitat for delta mudwort and delta tule pea by at least 5 miles in the Suisun Bay and Marsh EMU and by at least 10 miles in the Napa River EMUs.</p> <p>Bring at least 25% the currently existing but unprotected occurrences of delta mudwort and delta tule into protection through purchase or conservation agreement, and ensure appropriate management.</p>	Saline Emergent Wetland	all Central Valley salmonids, delta smelt, Sacramento splittail, California black rail, Mason’s lilaeopsis, delta mudwort, delta tule pea
<p>In the Suisun Marsh/North San Francisco Bay Ecological Management Zone, restore and manage a minimum of 500 acres of seasonal wetland, and improve management of a minimum of 7,000 acres of existing, degraded seasonal wetland in a manner that provides suitable habitat for salt marsh harvest mouse, San Pablo California vole, and Suisun ornate shrew.</p>	Seasonal Wetlands	salt marsh harvest mouse, San Pablo California vole, Suisun ornate shrew
<p>Restore a minimum of 400 acres of tidal perennial aquatic habitat in the Suisun Marsh/North San Francisco Bay Ecological Management Zone.</p>	Tidal Perennial Aquatic Habitat	all Central Valley salmonids, delta smelt, Sacramento splittail, longfin smelt

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop a cooperative program to acquire, manage and restore 100 acres of vernal pools and 500 to 1,000 acres of adjacent buffer areas in the Suisun Marsh/North San Francisco Bay EMZ.</p> <p>Protect all existing known occurrences of Crampton’s tuctoria through conservation easement or purchase from willing sellers (including CNDDDB Element Occurrence #2 and any new populations that are found). Identify at least two protected and managed sites for introduction of additional populations; begin introduction and monitor for success.</p> <p>Manage at least 250 acres of the ERP target for vernal pools near the Jepson Prairie preserve as suitable habitat for alkali milk vetch. Establish new populations on protected and appropriately managed lands. Bring 50% of currently unprotected, existing populations into protection through purchase or conservation agreement, and ensure appropriate management.</p>	Vernal Pools	Delta green ground beetle, Crampton’s tuctoria, Alkali milk- vetch
<u>Stressors Reduction</u>		
Develop a program to consolidate, screen, or eliminate 25% of the unscreened diversions in Suisun Marsh.	Water Diversions	all R and r covered fish
Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)	oxygen depleting substances, nutrients, TOC, ammonia	Salmonids, Sacramento splittail
Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
<p>Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.</p>	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	selenium	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Sacramento River Basin		
<u>Ecological Processes</u>		
<p>Construct a network of channels totaling 20 miles within the Sutter and Yolo Bypasses that effectively drains flooded lands after floodflows stop entering the bypasses. The channels should be designed to allow juvenile anadromous and resident fish to move from rearing and migratory areas.</p> <p>Develop and begin implementation of a program in the Yolo Basin to restore channel-floodplain connectivity and floodplain processes. Design natural stream channel configurations and expand floodplain overflow areas in the lower Cache and Putah Creek floodplains, as well as in channels and sloughs of the upper Yolo Bypass to provide connections with the Delta in a manner consistent with flood control requirements. Diversions (water source) into the Yolo Basin should not result in direct or indirect adverse impacts to salmonids. Project design features would include sloughs and creek channels, setback levees, and wetlands, where feasible and consistent with flood protection.</p>	Natural Floodplain and Flood Processes	Central Valley chinook salmon and steelhead, Sacramento splittail
<p>Develop and implement temperature management programs within major tributaries in the Sacramento River Basin. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.</p>	Central Valley Stream Temperatures	Central Valley fall/late fall-run chinook salmon and steelhead

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement a program to address the thermal impacts of irrigation return flows in the Sacramento River Basin. The goal of the program should be achieve Basin Plan objectives for water temperature. The program should include provisions to: a) identify locations of irrigation return flows with thermal impacts; b) develop measures to avoid or eliminate thermal impacts from irrigation return flows; and c) prioritize problem sites based on impacts to chinook salmon and steelhead. If feasible, proceed with implementation of some or all actions to address thermal impacts of irrigation return flows.</p>	<p>Central Valley Stream Temperatures</p>	<p>Central Valley fall/late fall-run chinook salmon and steelhead</p>
<p>Design and begin implementation of an ecologically based streamflow regulation plan for Yuba River, Butte Creek, Big Chico Creek, Deer Creek, Mill Creek , Antelope Creek, Battle Creek, Cottonwood Creek, and Clear Creek.</p>	<p>Central Valley Streamflow</p>	<p>all Central Valley salmonids, green sturgeon, Sacramento splittail, western yellow-billed cuckoo, yellow warbler, Least Bell’s vireo</p>
<p>Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within each EMZ in the Sacramento River Basin.</p>	<p>Coarse Sediment Supply</p>	<p>all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Norther California black walnut</p>
<p>Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within each of the EMZs in the Sacramento River Basin. Among the areas to be included are the lower 10 miles of Clear Creek, Antelope Creek, and Deer Creek, and the lower reach of Cottonwood Creek.</p>	<p>Natural Floodplain and Flood Processes</p>	<p>all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Protect 15,000 acres within the Inner River Zone areas between Red Bluff and Colusa reaches within identified the Sacramento River Conservation Area. Establish between 3 and 5 habitat preserves for bank swallows along the upper reaches of the Sacramento River capable of supporting 5000 bank swallow burrows between the towns of Colusa and Red Bluff.</p>	Stream Meander	all Central Valley salmonids, steelhead, western yellow-billed cuckoo, Least Bell’s vireo, Swainson’s hawk, Valley elderberry longhorn beetle, bank swallow
<u>Habitats</u>		
<p>In the American River Basin, Butte Basin, Colusa Basin, Feather River/Sutter Basin EMZs, cooperatively enhance at least 15 to 25% of the ERPP target for wildlife friendly agricultural practices.</p>	Agricultural Lands	greater sandhill crane, giant garter snake, Swainson’s hawk
<p>Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat, and instream cover along at least one tributary within each of the following Ecological Management Zones: American River Basin, Butte Basin, Colusa Basin, Cottonwood Creek, Feather River/Sutter Basin, North Sacramento Valley, Sacramento River, and Yolo Basin. While restoring habitat conditions in the American River EMZ, maintain continuous corridors of suitable riparian habitat for valley elderberry longhorn beetle.</p> <p>Protect existing known occurrences of northern California black walnut native stands through conservation easement or purchase.</p> <p>Identify at least 3 protected and managed sites for introduction of additional populations of northern California black walnut; begin introduction and monitor for success. Population creation should be part of a broader effort to restore riparian areas which historically contained walnut.</p>	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, western yellow-billed cuckoo, Valley elderberry long-horn beetle, California yellow warbler, Least Bell’s vireo, little willow flycatcher

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
In the Cottonwood Creek EMZ, complete (1) long-term agreements with local landowners to establish, restore, and maintain riparian communities along 25 percent of the upper and 25 percent of the lower reaches of Cottonwood Creek, and (2) the development of a comprehensive watershed management plan that supports local land use decisions to protect existing riparian and restore lost riparian.	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, little willow flycatcher
Restore 2 miles of the 10 mile target of riparian habitat restoration along the lower reaches of each of the following tributaries: Battle, Clear, Deer, Mill, Butte, Big Chico, Antelope, Feather, Yuba, and Bear Rivers.	Riparian and Riverine Aquatic Habitats	all Central Valley salmonids, California yellow warbler, western yellow-billed cuckoo, little willow flycatcher, Least Bell’s vireo, Valley elderberry long-horn beetle
Implement 25 percent of the ERP target for enhancing, protecting, and restoring seasonal wetlands in the following EMZs: American River Basin, Butte Basin, Colusa Basin, and Feather River/Sutter Basin.	Seasonal Wetlands	greater sandhill crane, Swainson’s hawk, giant garter snake
<u>Stressors Reduction</u>		
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within Sacramento River Basin tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	all Central Valley salmonids, green sturgeon, Sacramento splittail
Provide unimpeded upstream and downstream passage for salmon and steelhead on Sacramento River Basin tributaries.	Dams and Other Structures	all Central Valley salmonids, green sturgeon, Sacramento splittail
On Big Chico Creek, repair the Lindo Channel weir and fishway at the Lindo Channel box culvert at the Five Mile Diversion to improve upstream fish passage.	Dams and Other Structures	all Central Valley salmonids
Develop and implement a solution to improve passage of upstream migrant adult fish and downstream migrant juvenile fish Battle Creek.	Dams and Other Structures	all Central Valley salmonids, green sturgeon

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Evaluate the feasibility of constructing fish passage facilities at the Grays Bend-Old River-Freemont weir complex at the upper end of the Yolo Bypass.	Dams and Other Structures	all Central Valley salmonids
Develop a program to reduce or eliminate fish stranding in the Sacramento, Feather and Yuba rivers and the Colusa Basin drain and Sutter Bypass in the active stream channels, floodplains, shallow ponds and borrow areas. Develop protocols for ramping flow reductions. Conduct surveys of stranding under a range of flow conditions and recommend solutions.	Stranding	all Central Valley salmonids, green sturgeon, longfin smelt, Sacramento splittail
Install positive barrier fish screens on all diversions greater than 250 cfs in all EMZs and 25% of all smaller unscreened diversions in the Sacramento River Basin. Among those diversions to be screened are the DWR Pumping Plants and 50% of small diversion located on east side of Sutter Bypass, the Bella Vista diversion in the upper Sacramento River near Redding, East-West Diversion Weir, Weir 5, Weir 3, Guisti Weir and Weir 1 in the Sutter Bypass, White Mallard Dam, Morton Weir, Drivers Cut Outfall and Colusa Shooting/Tarke Weir Outfall and associated diversion screens in the Butte Sink..	Water Diversions	all R and r covered fish
Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)	oxygen depleting substances, nutrients, TOC, ammonia	Salmonids, Sacramento splittail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate inter-substrate low dissolved oxygen conditions in salmonid spawning and rearing habitat, especially in the Mokelumne, Cosumnes, American, Merced, Tuolumne, and Stanislaus Rivers (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Develop inter-substrate DO testing for salmonid spawning and rearing habitat. • Conduct comprehensive surveys to assess the extent and severity of inter-substrate low DO conditions. • Develop and begin implementing appropriate best management practices (BMPs), including reducing anthropogenic fine sediment loads, to minimize or eliminate inter-substrate low DO conditions. 	dissolved oxygen, turbidity/ sedimentation	Salmonids
Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following mercury evaluation and abatement work in the Cache Creek watershed (from Phase II Report):</p> <ul style="list-style-type: none"> • Support development and implementation of TMDL for mercury. • Determine bioaccumulation effects in creek and Delta. • Source, transport, inventory, mapping and speciation of mercury. • Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate. • Determine sources of high levels of bioavailable mercury 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake
<p>Conduct the following mercury evaluation and abatement work in the Sacramento River (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine, inventory, and sources of high levels of bioavailable mercury • Refine mercury models. • Participate in remedial activities. 	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
San Joaquin River Basin		
Ecological Processes		
<p>Develop and implement temperature management programs within major tributaries in the San Joaquin River Basin. The goal of the programs should be achievement of the ERP temperature targets for salmon and steelhead. The programs shall include provisions to: a) develop accurate and reliable water temperature prediction models; b) evaluate the use of minimum carryover storage levels and other operational tools; c) evaluate the use of new facilities such as temperature control devices; and d) recommend operational and/or physical facilities as a long-term solution.</p>	Central Valley Stream Temperatures	Central Valley fall/late fall-run chinook salmon and steelhead

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement a program to address the thermal impacts of irrigation return flows in the San Joaquin River Basin. The goal of the program should be achieve Basin Plan objectives for water temperature. The program should include provisions to: a) identify locations of irrigation return flows with thermal impacts; b) develop measures to avoid or eliminate thermal impacts from irrigation return flows; and c) prioritize problem sites based on impacts to chinook salmon and steelhead. If feasible, proceed with implementation of some or all actions to address thermal impacts of irrigation return flows.</p>	<p>Central Valley Stream Temperatures</p>	<p>Central Valley fall/late fall-run chinook salmon and steelhead</p>
<p>Complete a fluvial geomorphic assessment of coarse sediment supply needs and sources to maintain, improve, or supplement gravel recruitment and natural sediment transport processes linked to stream channel maintenance, erosion and deposition, maintenance of fish spawning areas, and the regeneration of riparian vegetation. Develop and implement a program to reduce erosion and maintain gravel recruitment on at least one tributary within each EMZ within the San Joaquin River Basin. In the East San Joaquin Basin EMZ, complete fluvial geomorphic assessments on all tributaries.</p>	<p>Coarse Sediment Supply</p>	<p>all races of chinook salmon, steelhead, splittail, delta smelt, green sturgeon, bank swallow, California yellow warbler, western yellow-billed cuckoo, Least Bell’s vireo, valley elderberry longhorn beetle, Northern California black walnut</p>
<p>Develop floodplain management plans, including feasibility studies to construct setback levees, to restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis for at least one tributary within each of the EMZs in the San Joaquin River Basin. Among the areas to be included are at least 10 miles of stream channel in the West San Joaquin EMZ.</p>	<p>Natural Floodplain and Flood Processes</p>	<p>all Central Valley salmonids, Sacramento splittail, delta smelt, longfin smelt, western yellow-billed cuckoo, California yellow warbler, Least Bell’s vireo, San Joaquin Valley woodrat, Valley elderberry long-horn beetle, Northern California black walnut</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Develop a cooperative program to restore salmonid spawning and rearing habitat in the Tuolumne, Stanislaus, and Merced Rivers that includes the following elements: (1) reconstructing channels at selected sites by isolating or filling in inchannel gravel extraction areas; (2) increasing natural meander by removing riprap and relocating other structures that impair stream meander; and (3) restoring more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.	Stream Meander (also Predation and Competition)	Central Valley fall/late fall-run chinook salmon, steelhead, western yellow-billed cuckoo, California yellow warbler, bank swallow
Restore and maintain a defined stream-meander zone and increase floodplain habitat on the San Joaquin River between Vernalis and the mouth of the Merced River.	Stream Meander	Sacramento splittail, Central Valley fall/late fall-run chinook salmon, steelhead, bank swallow
Establish a river meander corridor between the Chowchilla Bypass and Mendota Pool to expand the floodway corridor to convey increased anticipated floodflows and restore floodplain habitat.	Stream Meander	Sacramento splittail, Central Valley fall/late fall-run chinook salmon, steelhead, bank swallow
<u>Habitats</u>		
In the San Joaquin River and West San Joaquin Basin EMZs, cooperatively enhance at least 15 to 25% of the ERPP target for wildlife friendly agricultural practices	Agricultural Lands	Swainson’s hawk, greater sandhill crane, giant garter snake
In the West San Joaquin Basin EMZ, restoring or create 100 acres of fresh emergent wetland habitat.	Fresh Emergent Wetland	giant garter snake
In the West San Joaquin Basin EMZ, restore or enhance 1,000 acres of perennial grassland associated with existing or proposed wildlife corridors, wetlands, or floodplain habitats.	Perennial Grasslands	Swainson’s hawk, greater sandhill crane

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat and instream cover along at least one tributary within the East San Joaquin and San Joaquin River EMZs.</p>	<p>Riparian and Riverine Aquatic Habitats</p>	<p>Central Valley steelhead, fall/late fall-run chinook salmon, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit, California yellow warbler, Least Bell’s vireo, little willow flycatcher, delta coyote thistle</p>
<p>Implement 25 percent of the ERP target for diverse, self-sustaining riparian community for all EMZs in the San Joaquin River Basin.</p> <p>Bring at least three of the currently existing but unprotected delta coyote thistle occurrences into protection through purchase or conservation agreement, and ensure appropriate management.</p> <p>Increase suitable habitat for delta coyote thistle by at least 20% and the number of populations and individuals by at least 10% through habitat management and protection.</p> <p>Establish two new riparian brush rabbit habitat preserves within the historical range of the species. Protect and enhance a minimum of 150 contiguous acres of mature, shrub-rich riparian forest and associated highwater refugia on the San Joaquin River, between the Merced River confluence and Vernalis, and on each of the east-side tributaries (the Stanislaus, Tuolumne and Merced rivers) for habitat values and as potential riparian brush rabbit re-introduction sites.</p>	<p>Riparian and Riverine Aquatic Habitats</p>	<p>San Joaquin Valley woodrat, delta coyote thistle, western yellow-billed cuckoo, Valley elderberry long-horn beetle, riparian brush rabbit</p>

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<u>Stressors Reduction</u>		
Develop and implement a program to address inadequate instream flows for steelhead and chinook salmon on streams within San Joaquin River tributaries. Where appropriate provide adequate flows for Sacramento splittail and green sturgeon.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon, green sturgeon, Sacramento splittail
Provide unimpeded upstream and downstream passage for salmon and steelhead on San Joaquin River Basin tributaries.	Dams and Other Structures	steelhead, fall/late fall-run chinook salmon
Initiate a feasibility study of restoring steelhead migration into upper watershed areas (e.g., upstream of major low-elevation dams) in at least one San Joaquin River Basin EMZ Tributary.	Dams and Other Structures	steelhead
Install positive barrier fish screens on all diversions greater than 250 cfs in all EMZs and 25% of all smaller unscreened diversions in the San Joaquin River Basin. Among those diversions to be screened are the El Solyo, Patterson, and West Stanislaus irrigation district diversions.	Water Diversions	all R and r covered fish

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Actions to minimize or eliminate low dissolved oxygen conditions (DO sag) in lower San Joaquin River near Stockton (from Phase II Report):</p> <ul style="list-style-type: none"> • Complete studies of causes for DO sag in San Joaquin River near Stockton. • Define and implement corrective measures for DO sag. • Finalization of investigation of methods to reduce constituents that cause low DO for inclusion in total maximum daily load (TMDL) recommendation by the Central Valley RWQCB. • Finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River. • Implement appropriate source and other controls and other management practices, as recommended in the TMDL, to reduce anthropogenic oxygen depleting substances loadings and minimize or eliminate low DO conditions. 	<p>dissolved oxygen, oxygen depleting substances, nutrients, total organic carbon (TOC)</p>	<p>Salmonids, delta smelt, Sacramento splittail, longfin smelt, green sturgeon</p>
<p>Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations. (from Phase II Report)</p>	<p>oxygen depleting substances, nutrients, TOC, ammonia</p>	<p>Salmonids, Sacramento splittail</p>
<p>Actions to minimize or eliminate inter-substrate low dissolved oxygen conditions in salmonid spawning and rearing habitat, especially in the Mokelumne, Cosumnes, American, Merced, Tuolumne, and Stanislaus Rivers (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Develop inter-substrate DO testing for salmonid spawning and rearing habitat. • Conduct comprehensive surveys to assess the extent and severity of inter-substrate low DO conditions. • Develop and begin implementing appropriate best management practices (BMPs), including reducing anthropogenic fine sediment loads, to minimize or eliminate inter-substrate low DO conditions. 	<p>dissolved oxygen, turbidity/ sedimentation</p>	<p>Salmonids</p>

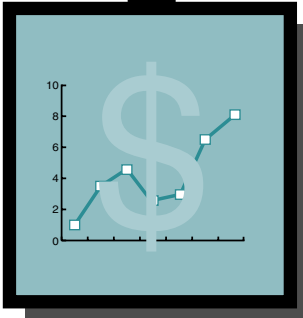
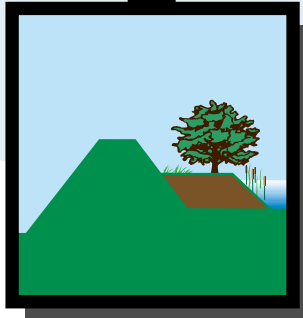
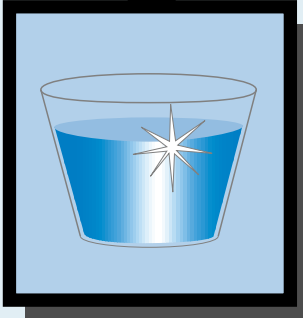
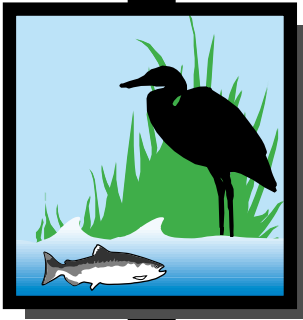
Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Assess the ecological effects of low DO conditions in Suisun Marsh due to adding oxygen-depleted water from anthropogenic sources (from Water Quality Program Plan).	dissolved oxygen, oxygen depleting substances, nutrients, TOC	Delta smelt, Sacramento splittail, longfin smelt, salmonids, green sturgeon
Encourage regulatory activity to reduce discharge of oxygen reducing substances and nutrients by unpermitted dischargers. (from Phase II Report)	dissolved oxygen, oxygen depleting substances, nutrients	Salmonids, Sacramento splittail
<p>Actions to reduce fine sediment loading to streams, especially Tuolumne, Merced, Stanislaus, Cosumnes, Napa, and Petaluma Rivers, and Sonoma Creek, due to human activities (from Phase II Report and Water Quality Program Plan):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs in construction areas, on agricultural lands, for urban stormwater runoff, and other specific sites. • Implement stream restoration and revegetation work. • Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions. 	turbidity/ sedimentation	Salmonids
Conduct the necessary research to determine no adverse ecological/biological effects threshold concentrations for mercury in sediments and key organisms in the Bay-Delta estuary and its watershed.	mercury	Salmonids, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following pesticide work (from Phase II Report):</p> <ul style="list-style-type: none"> • Develop diazinon and chlorpyrifos hazard assessment criteria with CDFG and the Department of Pesticide Regulations. • Support development and implementation of a TMDL for diazinon. • Develop BMPs for dormant spray and household uses. • Determine the ecological significance of pesticide discharges. • Support implementation of BMPs. • Monitor to determine effectiveness of BMPs 	carbofurans, chloropyrifos, diazinon	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, possibly other species depending on type of actions and specific sites.

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following selenium work:</p> <ul style="list-style-type: none"> • Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (from Phase II Report). • Evaluate and, if appropriate, implement real-time management of selenium discharges (from Phase II Report). • Expand and implement source control, treatment, and reuse programs (from Phase II Report). • Coordinate with other programs; e.g., recommendations of San Joaquin Valley Drainage Implementation Program, CVPIA for retirement of lands with drainage problems that are not subject to correction in other ways (from Phase II Report). • Support development and implementation of TMDL for selenium in the San Joaquin River watershed (focus on Grassland area). 	selenium	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following actions in reduce organochlorine pesticide inputs to streams (from Phase II Report):</p> <ul style="list-style-type: none"> • Participate in implementation of USDA sediment reduction program. • Implement sediment reduction BMPs on agricultural lands and other specific sites. • Implement BMPs for urban/industrial stormwater runoff and discharges to reduce PCB and organochlorine pesticides. 	chlorodane, DDT, PCBs, toxaphene	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
<p>Conduct the following trace metals work (from Phase II Report):</p> <ul style="list-style-type: none"> • Determine spatial and temporal extent of metal pollution. • Determine ecological significance and extent of copper contamination. • Evaluate impacts of other metals such as cadmium, zinc, and chromium. • Participate in Brake Pad Partnership to reduce introduction of copper. • Partner with municipalities on evaluation and implementation of stormwater control facilities. • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration. 	cadmium, copper, zinc	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, giant garter snake, salt marsh harvest mouse, California clapper rail, California black rail
<p>Conduct the following unknown toxicity work (from Phase II Report):</p> <ul style="list-style-type: none"> • Conduct appropriate studies to identify unknown toxicity, and develop management actions as appropriate. 	toxicity of unknown origin	Salmonids, delta smelt, longfin smelt, Sacramento splittail, green sturgeon
Research Milestones		
<p>Develop and implement a comprehensive monitoring, assessment and research program (CMARP) for terrestrial and aquatic habitats and species populations acceptable to the fish and wildlife agencies. Conduct rangewide surveys for all “R” and “r” covered plants and animals in the MSCS Focus Area.</p>		
<p>Develop and begin implementation of a study to determine appropriate conditions for the germination and establishment of riparian woody plants along the Sacramento River and San Joaquin River. Complete development of a cooperative program to plant vegetation on unvegetated riprapped banks consistent with flood control requirements.</p>		

Milestones	Ecosystem Element/Water Quality Parameter	MSCS “R” and “r” Covered Species that would Benefit from Achieving Milestones
Conduct a study to investigate the effects of the road through Olcott Lake on vernal pool hydrology and impacts on vernal pool species.		
Conduct instream flow studies to determine the flows necessary to support all life stages of anadromous and estuarine fish species.		
Conduct an investigation of in-channel structures that focuses on the following issues: (1) habitat suitability for both predator and prey fishes; (2) predator-prey interactions; and (3) recommendations for reducing predation on juvenile salmonids.		
Conduct experimental introductions of Sacramento perch into nontidal perennial aquatic habitats		
Assess the impact of hatchery practices on naturally spawning populations of chinook salmon and steelhead and operate hatcheries in a manner consistent with safe genetic practices that will maintain genetic integrity of all Central Valley anadromous salmonid populations.		
Through the use of existing, expanded, and new programs, monitor adult anadromous salmonid returns to each watershed within the MSCS focus area. Monitoring techniques, data compilation and analysis, and reporting should be standardized among researchers and watersheds to the greatest extent possible.		

August 28, 2000



CALFED
BAY-DELTA
PROGRAM

Attachment 8

Clean Water Act Section 401

Memorandum of Understanding

August 28, 2000

**MEMORANDUM OF UNDERSTANDING
ON CLEAN WATER ACT SECTION 401
FOR THE CALFED BAY-DELTA PROGRAM**

RECITALS

These recitals provide background and context for the Memorandum of Understanding (401 MOU) that follows.

A. In 1994, the Governor's Water Policy Council of the State of California and the Federal Ecosystem Directorate entered into a Framework Agreement to establish a comprehensive program for coordination and communication with respect to environmental protection and water supply dependability in the Bay-Delta Estuary. This Framework Agreement served as the basis for the CALFED Bay-Delta Program.

B. The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The CALFED Bay-Delta Program is also guided by solution principles adopted by CALFED agencies. According to the solution principles, a successful Bay-Delta solution must reduce conflicts in the system, be equitable, be affordable, be durable, be implementable, and have no significant redirected impacts.

C. To achieve its purposes, the CALFED Bay-Delta Program has developed eight broad programs as elements of the CALFED Preferred Program Alternative. These program elements are:

1. Ecosystem Restoration Program
2. Levee System Integrity Program
3. Storage
4. Conveyance
5. Water Use Efficiency Program
6. Water Quality Program
7. Water Transfer Program
8. Watershed Program

D. The CALFED Bay-Delta Program seeks to initiate implementation of its Preferred Program Alternative after execution of a Record of Decision and Certification pursuant to NEPA and CEQA. The 30-year implementation period following the Record of Decision and Certification is referred to as Phase III of the Program. The CALFED Bay-Delta Program has defined the first seven years after execution of a Record of Decision and Certification as Stage 1 of Phase III.

E. The CALFED Program includes activities that may result in a discharge into waters of the United States.

F. The Clean Water Act (Act) establishes a goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. Under Section 401 of the Act, applicants for Federal licenses or permits for activities that may result in a discharge into waters of the United States must first obtain a certification from the state in which the discharge would originate. The certification must verify that the discharge will comply with the applicable effluent limitations, State water quality standards and other appropriate requirements. A certification for the construction of a facility must also cover the operation of the facility. The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) issue water quality certifications pursuant to Section 401 of the Act, pursuant to Water Code section 13160, and pursuant to California Code of Regulations, title 23, sections 3830-3869. Applications for 401 certifications are filed in the manner set forth in California Code of Regulations, title 23, section 3855¹.

G. Section 401 certification is not required for the selection of the Preferred Program Alternative, but may be required prior to implementing individual components of the Preferred Program Alternative. An applicant must provide the materials specified in California Code of Regulations, title 23, section 3856 to the Executive Officer of a RWQCB or to the Executive Director of the SWRCB.

H. The SWRCB or the RWQCB, as provided in California Code of Regulations, title 23, sections 3855-3861, may issue certification or deny certification.

I. DEFINITIONS

Signatories are CALFED agencies that have executed this Understanding. Signatories include the U.S. Bureau of Reclamation, the State Water Resources Control Board, the Regional Water Quality Control Boards for the Central Valley Region and the San Francisco Bay Region, the California Department of Water Resources and the California Department of Fish and Game.

Stage 1 Actions are those CALFED Actions that have been designated by the CALFED Policy Group, or its successor, to begin implementation during the seven-year period immediately following execution of the Record of Decision and Certification of the Final Programmatic Environmental Impact Statement and Environmental Impact Report (EIS/EIR) for the CALFED Bay-Delta Program.

Phase II is the period of time during which the CALFED agencies developed a Preferred Program Alternative, conducted comprehensive environmental review, and developed a plan for implementing the Preferred Program Alternative. Phase II concludes with the filing of a Record of Decision and Certification of the Final Programmatic EIS/EIR.

¹ For example, applications for 401 certification are typically filed with the RWQCB executive officer in whose region a discharge may occur, except that 401 applications are filed with the executive director of the SWRCB for projects that involve (1) multiple RWQCBs (2) application for water rights or other diversions of water for beneficial use or (3) requests to the Federal Energy Regulatory Commission for licenses or amendments to licenses.

Phase III refers to the period of time following the Record of Decision and Certification through the 30-year planning horizon used in developing the CALFED plan. Phase III will include site-specific environmental review and permitting.

II. UNDERSTANDING

- A. The Signatories acknowledge that individual CALFED Program activities in Phase III must be consistent with Clean Water Act section 401.
- B. The Signatories recognize the integrated nature of the CALFED Program and will evaluate individual activities in the context of the overall program.
- C. The Signatories recognize that this Understanding makes no conclusions about the nature of, or extent of, control measures that may be required for individual activities that need Clean Water Act Section 401 certification.
- D. The Signatories recognize that the CALFED agencies have completed and certified a Final Programmatic Environmental Impact Statement and Report (EIS/EIR) for the CALFED Bay-Delta Program.
- E. The SWRCB and RWQCBs agree that 401 certifications for actions consistent with the Final Programmatic EIS/EIR will be based on whether the proposed discharge complies with applicable effluent limitations, State water quality standards and other appropriate water quality requirements.
- F. The Signatories agree to consider a generalized permit certification process during Stage 1 of implementation, pursuant to California Code of Regulations, title 23, section 3861.

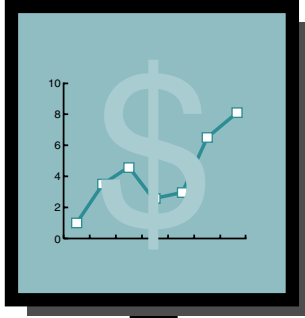
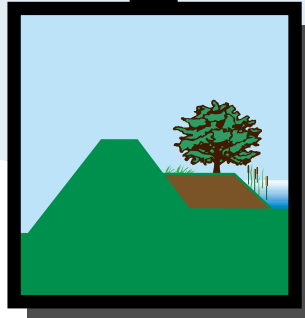
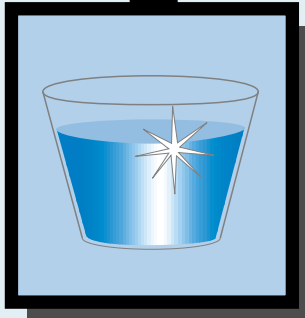
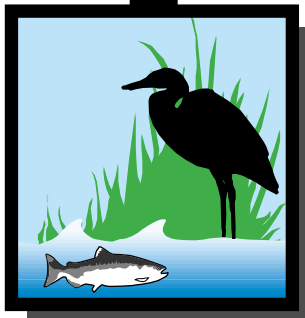
III. ADDITIONAL PROVISIONS

- A. Applicability of this Understanding.** This Understanding was developed in response to a unique circumstance, namely the CALFED Bay-Delta Program, and does not have broader applicability beyond the CALFED Program.
- B. Limitations on this Understanding.** This Understanding does not provide a determination of compliance for individual CALFED activities that may result in a discharge of a pollutant into waters of the United States.
- C. Reservation of Authorities.** This Understanding does not modify existing agency authorities by reducing, expanding or transferring any of the statutory or regulatory authorities and responsibilities of any of the Signatories.

D. Reservation of Agency Position. No Signatory to this Understanding waives any administrative claims, positions, or interpretations it may have with respect to the applicability or enforceability of any law or regulation.

E. Obligation of Funds, Commitment of Resources. Nothing in this Understanding shall be construed as obligating any of the Signatories to the expenditure of funds in excess of appropriations authorized by law or otherwise commit any of the Signatories to actions for which it lacks statutory authority.

F. Nature of Understanding. This Understanding is not intended to, and does not, create any other right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, the State of California, any agencies thereof, any officers or employees thereof, or any other person.



CALFED
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Attachment 9 Coastal Zone Management Act Programmatic Consistency Determination

August 28, 2000



CALFED
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**COASTAL ZONE MANAGEMENT ACT
PROGRAMMATIC CONSISTENCY DETERMINATION
FOR THE CALFED BAY-DELTA PROGRAM**

July 2000

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List of Acronyms

- Coastal Zone Management Act of 1972 (CZMA) (1)
- National Oceanic and Atmospheric Administration (NOAA) (1)
- California Coastal Act of 1976 (Coastal Act) (1)
- San Francisco Bay Conservation and Development Commission (BCDC) (1)
- CALFED Bay-Delta Program (CALFED) (1)
- San Francisco Bay/Sacramento-San Joaquin Delta estuary (Bay-Delta) (2)
- Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (2)
- Ecosystem Restoration Program (ERP) (3)
- best management practices [BMPs] (5)
- Clifton Court Forebay (CCFB) (6)
- Joint Point of Diversion (JPOD) (6)
- State Water Project (SWP) (6)
- Central Valley Project (CVP) (6)
- Thousand Acre Feet (TAF) (6)
- Million Acre Feet (MAF) (6)
- Delta Cross Channel (DCC) (7)
- Total organic carbon (TOC) (7)
- State Water Resources Control Board (SWRCB) (9)
- California Department of Fish and Game (DFG) (12)
- Environmental Water Account (EWA) (20)

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COASTAL ZONE MANAGEMENT ACT PROGRAMMATIC CONSISTENCY DETERMINATION FOR THE CALFED BAY-DELTA PROGRAM

1.0 BACKGROUND

The Coastal Zone Management Act of 1972 (CZMA) requires federal agencies to preserve, protect, and, where possible, restore and enhance the resources of the coastal zone (16 USC 1451 et seq.). Coastal states must develop coastal zone management programs to be reviewed and approved by the secretary of commerce through the National Oceanic and Atmospheric Administration (NOAA). Federal agencies are required to certify that any proposed activities within or affecting the coastal zone are consistent with the coastal state's program. The coastal state notifies the federal agencies of its concurrence with or objection to the certification. If the coastal state finds that the proposed activity is inconsistent with its program, the federal agencies must obtain an override from the Secretary of Commerce before action can commence.

California developed a coastal zone management program through the McAteer/Petris Act, the Suisun Marsh Preservation Act and the California Coastal Act of 1976 (Coastal Act) (Division 20, 30000 et seq. Cal. Pub. Res. Code). Local governments within the coastal zone are responsible for implementing the program. The San Francisco Bay Conservation and Development Commission (BCDC) oversees the San Francisco Bay segment of the coastal zone management program, in addition to administering the other two above-referenced laws, and has permit jurisdiction over projects at any location within 100 feet inland of the highest tidal action around San Francisco and Suisun Bays. It has jurisdiction over projects within specific waterways up to the legally defined Sacramento-San Joaquin Delta (east of Chipps Island) that empty into San Francisco Bay and within specific saltponds and managed wetlands. Additionally, BCDC has direct permit authority over all activities and land uses defined in the Suisun Marsh Preservation Act, specifically projects within the "primary management area", which includes all tidal waters and marshes, managed wetlands, and lowland grasslands. Any person or public agency proposing to deposit fill; extract materials; or change the use of water, land, or structures in or around San Francisco or Suisun Bays must obtain a development permit from BCDC or, if proposing to conduct such development in or around Suisun Marsh, a marsh development permit from BCDC.

The CALFED Bay-Delta Program (CALFED) Preferred Alternative includes programmatic actions (undertaken either directly or indirectly through approval by federal agencies) that would most likely involve depositing fill; extracting materials; or changing the use of water, land, or structures in or around San Francisco or Suisun Bays and therefore would require compliance with CZMA. Because these activities have the potential to affect the coastal zone, CALFED prepared this consistency determination to document the possible effects of the Preferred Alternative on coastal resources and the actions that CALFED will take to ensure that the Preferred Alternative is implemented in a manner consistent, to the maximum extent practicable, with the McAteer/Petris Act, the Suisun Marsh Preservation Act and CZMA. The potential

geographic overlap between CALFED's geographic scope and BCDC's coastal zone jurisdiction is depicted in Figure 1.

This federal consistency determination is based on a general evaluation of the proposed CALFED action at the programmatic level. Development and environmental review of the Preferred Alternative during Phase II requires compliance with CZMA even though no specific action will be implemented during this phase. CALFED implementing agencies will return to the Commission for individual permits/consistency determinations at the time site-specific projects are proposed.

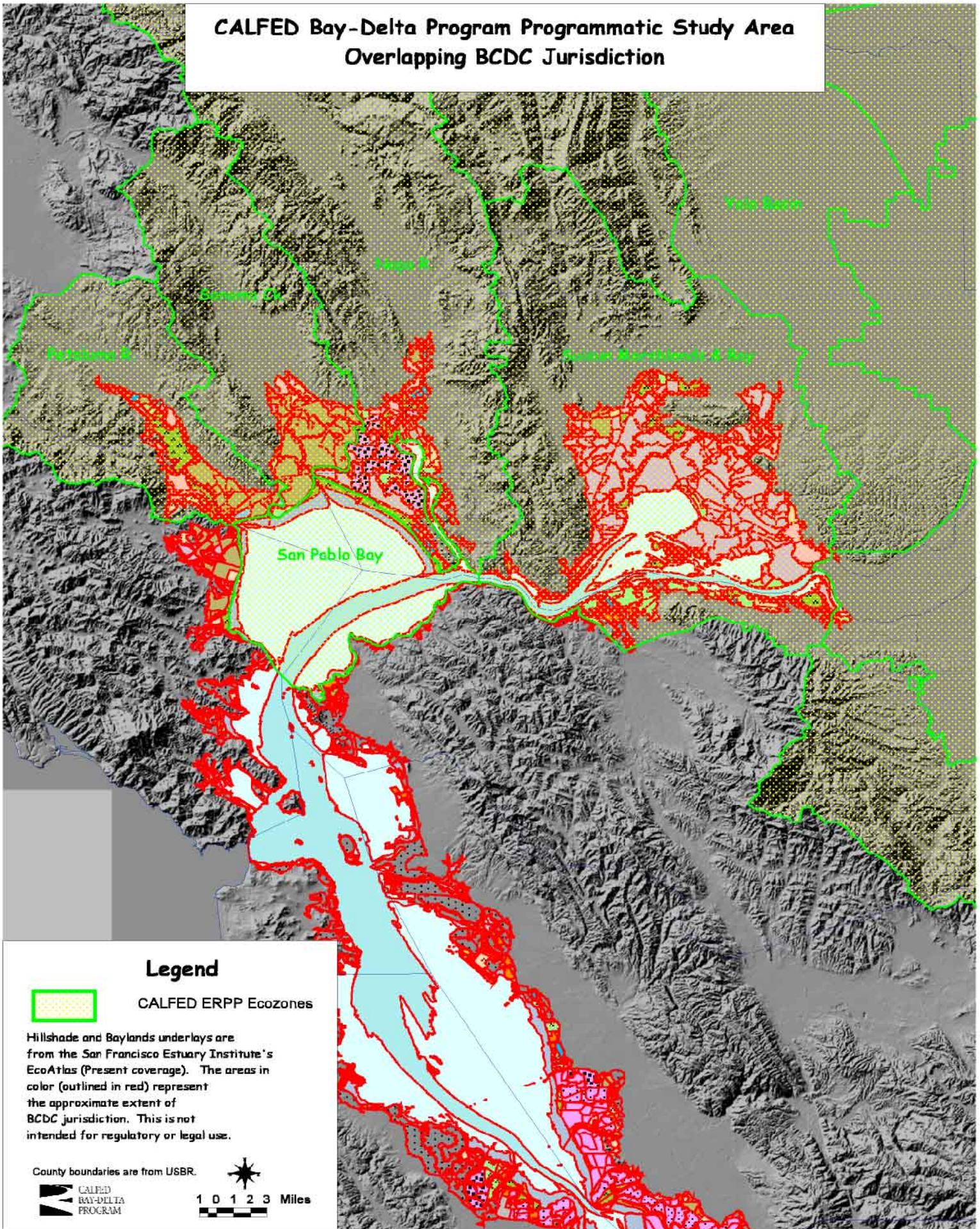
2.0 DESCRIPTION OF THE PROPOSED CALFED BAY-DELTA PROGRAM

CALFED is currently at the culmination of a years-long planning process that began with the signing of the Bay-Delta Accord in 1996. Since that time, 18 state and federal agencies have worked together to devise a plan for restoring the ecosystem of the fragile Bay-Delta, while meeting the water reliability and water quality needs of millions of the state's citizens. During this process, there has been close and ongoing consultation with all the stakeholders involved with the ecosystem and water use. This process has been long and difficult, but has resulted in the current Preferred Alternative, which most involved stakeholders and political leaders agree will go the furthest toward meeting the many differing goals of CALFED.

As described in the EIS/EIR and Program Plans, CALFED will be of tremendous benefit to the Bay and its ecosystem. Under CALFED, tens of thousands of acres of land will be improved for habitat or restored to their natural marsh conditions. CALFED actions will be aimed at improving conditions for many Bay species, especially anadromous fish and endangered species. High-quality fresh water will be available during times of the year when dealing with saltwater intrusion is most problematic. Overall flows to the Bay will be of better-quality water, with fewer pollutants and contaminants. If feasible, improved levees in the Suisun marsh will protect marsh habitats from the dangers of catastrophic levee failure, and resulting saltwater intrusion. Brackish marsh habitat will be protected and increased. By purchasing water for ecosystem needs, the Environmental Water Account will provide water for fish species when they need it most, without disrupting water needs of other users.

Against the many benefits to the Bay, the EIS/EIR acknowledges that there is a potential for adverse consequences. When outflows are at their highest, a small portion may be retained as storage. Currently, CALFED'S many experts and consultants are unable to document any adverse environmental impacts which would result from this detention, but part of the CALFED Program is to study the possible impacts of this action. Also, X2 may move a fraction of a kilometer to the east. Again, no adverse impact can be identified for this potential move, but CALFED has committed to study the issue. Before any individual projects are built, these questions would need to be answered, and impacts, if any, would need to be mitigated. Any project proposed within the jurisdiction of BCDC would need to return to the Commission for a consistency determination before that particular action or project could go forward.

CALFED Bay-Delta Program Programmatic Study Area Overlapping BCDC Jurisdiction



Viewed together, as CALFED must be, the many beneficial aspects of the Program to the Bay appear to outweigh the few potential negative aspects.

CALFED is a three-phase effort to develop a long-term solution to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary (Bay-Delta) in northern California. CALFED identified four categories of problems: ecosystem quality, water quality, water supply reliability, and levee system vulnerability. These categories are addressed through the CALFED Ecosystem Restoration Program, Water Quality Program, Water Use Efficiency Program, Water Transfer Program, Levee System Integrity Program, Watershed Program, Water Storage and Delta Conveyance.

During Phase I, CALFED identified the problems it would attempt to solve, developed a mission statement and several guiding principles, and designed three alternative solutions (including 17 variations). Phase II consisted of an effort to narrow the range of alternatives, a broad-based environmental review of four remaining alternative solutions and identification of one Preferred Alternative. This programmatic federal consistency determination is based on the outcome of Phase II.

Four Phase II alternatives were analyzed in the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Each of the alternatives includes common elements related to ecosystem restoration, water quality, water use efficiency, watershed, water transfers and levee system integrity. Programmatic actions related to water storage and Delta conveyance vary between the alternatives. The alternatives are described in detail in the Programmatic EIS/EIR Section 2, "Alternative Descriptions".

Phase III, which will involve project-level environmental reviews and approvals and implementation of the Preferred Alternative, will be executed in stages over 30 years or more. Stage I of the Program represents actions for the first 7 years. Proposed project-level actions under Phase III may require subsequent federal consistency determinations, as discussed in Section 5.0, "Next Steps". Phase III projects will be tiered from and be consistent with the Programmatic EIS/EIR, and will refer to the mitigation strategies and findings included in that document.

2.1 CALFED ECOSYSTEM RESTORATION PROGRAM

CALFED's proposed Ecosystem Restoration Program (ERP) focuses at a programmatic level primarily on the Bay-Delta, the Sacramento River, the San Joaquin River, and their tributary watersheds directly connected to the Bay-Delta system below major dams and reservoirs. Secondly, the ERP solution scope addresses San Francisco Bay, San Pablo Bay, Suisun Bay and the upper watersheds above the major dams.

The ERP focuses on restoring ecological processes associated with streamflow, stream channels, watersheds, and floodplains. The ERP implementation strategy relies heavily on adaptive management, a technique that involves identifying indicators of ecosystem health, comprehensively monitoring these indicators, improving understanding of the system through focused research, and implementing actions in

phases to incorporate new knowledge. The ERP includes the following broad ranges of programmatic restoration actions:

- # Protecting, restoring, and managing diverse habitat types representative of the Bay-Delta and its watershed.
- # Acquiring water from sources throughout the Bay-Delta's watershed to provide flows and habitat conditions for fishery protection and recovery.
- # Restoring critical in-stream and channel-forming flows in Bay-Delta tributaries.
- # Improving Delta outflow during key periods.
- # Maintaining brackish tidal wetlands in Suisun Marsh.
- # Reconnecting Bay-Delta tributaries with their floodplains through constructing setback levees, acquiring flood easements, and constructing and expanding flood bypasses.
- # Developing assessment, prevention, and control programs for invasive species.
- # Restoring aspects of the sediment regime by relocating in-stream and floodplain gravel mining, and by artificially introducing gravels to compensate for sediment trapped by dams.
- # Modifying or eliminating fish passage barriers, including removing dams, constructing fish ladders, and constructing fish screens that use the best available technology.

In addition to this range of actions, the Environmental Water Account (EWA), part of CALFED's Water Management Strategy, is designed to improve fisheries protection and recovery while providing improvements in water quality and water supply reliability. The EWA will rely on more flexible management of water based on real-time needs of the fishery resources. The EWA functions primarily by changing the timing of some flow releases from storage and the timing of water exports from the south Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish to Delta conditions. The EWA will be established to provide water for protection and recovery of fish beyond water available through existing regulatory actions related to project operations.

2.2 WATER QUALITY PROGRAM

The Program is committed to achieving continuous improvement in the quality of the waters of the Bay-Delta system—with the goals of minimizing ecological, drinking water, and other water quality problems and of maintaining this quality once achieved. Improvements in water quality will result in improved ecosystem health, with indirect improvements in water supply reliability. Improvements in water quality also

increase the utility of water, making it suitable for more uses. The Water Quality Program includes the following actions:

- # **Drinking water parameters.** Reducing the loads and impacts of bromide, total organic carbon (TOC), pathogens, nutrients, salinity, and turbidity through a combination of measures - including source reduction, alternative sources of water, treatment, storage, and, if necessary, conveyance improvements such as a screened diversion facility (up to 4,000 cfs) on the Sacramento River.
- # **Pesticides.** Reducing the impacts of pesticides through (1) development and implementation of best management practices (BMP's) for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education about and assistance with implementation of control strategies for the regulated pesticide users.
- # **Organochlorine pesticides.** Reducing the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMP's.
- # **Trace metals.** Reducing the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reducing the impacts of copper through urban stormwater programs and agricultural BMP's.
- # **Mercury.** Reducing mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
- # **Selenium.** Reducing selenium impacts through reduction of loads at their sources, and appropriate land fallowing and land retirement programs.
- # **Salinity.** Reducing salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies; facilitating development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta would be controlled by limiting salt loadings from its tributaries through managing sea-water intrusion by such means as: (1) using storage capability to maintain Delta outflow and to adjust the timing of outflow, (2) managing exports, and (3) making modifications to the Delta and Bay.
- # **Turbidity and sedimentation.** Reducing the turbidity and sedimentation that adversely affect several areas in the Bay-Delta and its tributaries.
- # **Low dissolved oxygen.** Reducing the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.

- # **Toxicity of unknown origin.** Through research and monitoring, identifying parameters of concern in the water and sediment, and implementing actions to reduce their impacts on aquatic resources.

2.3 WATER USE EFFICIENCY PROGRAM

The CALFED Water Use Efficiency Program reflects California's public policy that places strong emphasis on the efficient use of developed water supplies. The Water Use Efficiency Program includes policies covering five main areas: efficient use of agricultural water, urban water conservation, efficient use of environmental diversions (identification of BMPs for refuge water management and development of a planning process for managing water use at refuge and wetland areas), and water recycling. This will rely on local entities to implement water use efficiency actions to achieve objectives related to water quantity, quality, flow and timing. CALFED will develop an incentive grant program to invest in local projects that are not locally cost-effective. For most of these projects, some local benefits will accrue. When this is the case, CALFED will insist on a local cost share commensurate with the local benefits.

2.4 WATER TRANSFER PROGRAM

The Water Transfer Program will encourage the development of a more effective water market that facilitates water transfers and streamlines the approval process while protecting water rights, environmental conditions, and local economic interests. A more effective transfer market can improve water availability for all users, including the environment. Transfers can also help to match water demand with water sources of the appropriate quality, thus increasing the utility of water supplies.

2.5 LEVEE SYSTEM INTEGRITY PROGRAM

Improvements to Delta levees and channels are included in the Levee System Integrity Program to reduce the risk of failure caused by floods, earthquakes, and general deterioration of Delta flood control facilities. This program provides for uniform funding and guidance to increase the level of protection throughout the Delta and focuses on five approaches to improve the integrity of the Delta levee system:

- # Delta Levee Base Level Protection Plan. Improving and maintaining Delta levee system stability to meet the Corps' Public Law (PL) 84-99 standard.
- # Delta Levee Special Improvement Projects. Enhancing flood protection for key islands that provide state-wide benefits to the ecosystem, water supply, water quality, economy, and infrastructure.

- # Delta Levee Subsidence Control Plan. Implementing current best management practices (BMPs) to correct subsidence adjacent to levees and coordinating research to quantify the effects and extent of inner-island subsidence.
- # Delta Levee Emergency Management and Response Plan. Implementing actions that will build on existing state, federal, and local agency emergency management programs.
- # Delta Levee Risk Assessment. Performing a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence, and earthquakes; evaluating the consequences; and developing recommendations to manage the risk.

CALFED has also added the Suisun Marsh to its Levee Program to achieve its primary objectives in Ecosystem Restoration and Water Quality.

Ensuring the integrity of the exterior levees in the Suisun Marsh is critical to sustaining seasonal wetland values provided by the Marsh's managed wetlands. Improved levees would ensure that conversion to tidal wetlands will not be due to levee failure, but instead, will be planned with consideration of landowner support, ERP targets, regional wetland goals, and endangered species recovery plans.

CALFED's modeling research clearly indicates there is significant risk of water quality impacts in the Delta if Suisun Marsh levees are not maintained.

2.6 WATERSHED PROGRAM

CALFED's Watershed Program is designed to restore ecological health and improve water management of the Bay delta system by working with local communities at a watershed level. The Program will use a comprehensive, integrated basin-wide approach to help improve conditions in the Bay-Delta system, emphasizing local participation and government cooperation at all levels. The Watershed Program will focus on land and water management actions that will benefit water quality and improve water reliability in the Bay-Delta system. The Program will provide financial and technical assistance to local watershed groups to help assess, plan and conduct watershed management activities, including restoration projects, basin and project scale monitoring and conservation education.

2.7 STORAGE

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operation with existing flood control reservoirs.

CALFED initially evaluated twelve potential surface storage sites in Phase II. These potential sites have been narrowed to sites which will be evaluated in Phase III, and if found feasible, could begin construction. Potential storage projects include:

- # An in-Delta storage facility of approximately 250 TAF.
- # Expansion of CVP storage in Shasta Lake by approximately 300 TAF.
- # Expansion of Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply initiative.
- # Develop locally-managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF additional storage capacity.

An additional two storage sites will be evaluated in Stage I, with feasibility studies undertaken, and if found feasible, environmental review completed:

- # Sites Reservoir in Colusa County, with a potential storage of 1.9 MAF.
- # Additional storage of 250-700 TAF in the upper San Joaquin watershed

Aggressive implementation of water conservation, recycling, and a protective water transfer market would continue to be used as appropriate to meet Program goals. All projects would be required to complete environmental reviews, and would be subject to all applicable permit requirements.

2.8 CONVEYANCE

Four alternative variations for conveyance were analyzed in the Programmatic EIR/EIS. These four variations, which combine various strategies and facilities for diverting and conveying water from the Delta, are described in Chapter 2 of the EIS/EIR. This section focuses on a description of the water conveyance components of the Preferred Alternative, which forms the basis for the consistency determination.

The Preferred Program Alternative employs a through-Delta approach to conveyance. Modifications in conveyance would result in improved water supply reliability, protection of and improvement in Delta water quality, improvements in ecosystem health, and reduced risk of supply disruption due to catastrophic breaching of Delta levees.

South Delta Improvements. Under the Preferred Program Alternative, south Delta improvements include:

- # Constructing a new screened intake at Clifton Court Forebay (CCFB) with protective screening criteria.
- # Constructing either a new screened diversion at Tracy with protective screening criteria and/or expanding the new diversion at CCFB to meet the Tracy Pumping Plant export capacity.
- # Implementing the Joint Point of Diversion (JPOD) for the SWP and CVP, and constructing interties.
- # Constructing an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River.
- # Implementing actions to ensure the availability of water of adequate quantity and quality to agricultural diverters within the south Delta, and to contribute to restoring ecological health of aquatic resources in the lower San Joaquin River and south Delta. Actions may include channel dredging, extending and screening agricultural intakes, consolidating agricultural intakes, constructing operable barriers, and levee setbacks and levee improvements (such as reinforcing levees or controlling seepage). Actions will be staged, with appropriate monitoring and testing to guide the implementation process.
- # Changing the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities.

North Delta Improvements. Under the Preferred Program Alternative, north Delta improvements include:

- # Studying and evaluating a screened diversion facility on the Sacramento River with a range of diversion capacities up to 4,000 cfs as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in continuous improvements toward CALFED drinking water goals.

The diversion facility on the Sacramento River likely would include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The diversion facility on the Sacramento River is to be considered only after three separate assessments are satisfactorily completed: first, a thorough assessment of Delta Cross Channel (DCC) operation strategies and confirmation of continued concern over water quality impacts from DCC operations; second, a thorough evaluation of the technical viability of a diversion facility; and third, satisfactory resolution of the fisheries concerns about a diversion facility. The assessments of the DCC and the diversion facility on the Sacramento River will be completed simultaneously. The result of all three of these evaluations will be shared with the Delta Drinking Water Council or its successor and the expert panel evaluating fish impacts of Delta conveyance. If these evaluations demonstrate that a diversion facility on the Sacramento river is necessary to

address drinking water quality concerns and can be constructed without adversely affecting fish populations, the facility will be constructed as a part of the Preferred Program Alternative.

- # Constructing new setback levees or dredging and/or improving existing levees along the channels of the lower Mokelumne River system from I-5 downstream to the San Joaquin River.

3.0 MANAGEMENT PROGRAM FOR THE SAN FRANCISCO BAY SEGMENT OF THE CALIFORNIA COASTAL ZONE

BCDC's management program for the San Francisco Bay segment of the California coastal zone consists primarily of the policies contained in the San Francisco Bay Plan, the Suisun Marsh Protection Plan, and the McAteer-Petris Act (the legislation that created BCDC).

3.1 SAN FRANCISCO BAY PLAN

The San Francisco Bay Plan (San Francisco Bay Conservation and Development Commission 1969) sets forth policies relevant to CALFED programmatic-level actions that may occur within San Francisco Bay. These policies are summarized below.

3.1.1. FISH AND WILDLIFE

- # The benefits of fish and wildlife in the Bay should be ensured for present and future generations of Californians; therefore, to the greatest extent feasible, the remaining marshes and mudflats around the Bay, the remaining water volume and surface area of the Bay, and adequate freshwater inflow into the Bay should be maintained.
- # Specific habitats that are needed to prevent the extinction of any species or to maintain or increase any species that would provide substantial public benefits should be protected, whether in the Bay or on the shoreline behind dikes.

3.1.2 WATER QUALITY

- # To the greatest extent feasible, the area covered by Bay marshes and mudflats and the surface area and volume of Bay water should be maintained and, whenever possible, increased. Freshwater inflow to the Bay should be maintained at a level adequate to protect Bay resources and beneficial uses. Polluting Bay waters should be avoided.

- # Water quality in all parts of the Bay should be maintained at a level that will support and promote the beneficial uses of the Bay, as identified in the San Francisco Bay Regional Water Quality Control Board's basin plan.
- # Shoreline projects should be properly designed and appropriate erosion control practices should be used during construction to reduce soil erosion and protect the Bay from increased sedimentation.
- # Polluted runoff from projects should be controlled using BMPs to protect water quality and the beneficial uses of the Bay, especially where water dispersion is poor and the project is near shellfish beds or other significant biotic resources.

3.1.3 FRESHWATER INFLOW

- # Freshwater diversions should not cause reduced inflows into the Bay to the extent that it damages the oxygen content of the Bay, reduces flushing of the Bay, or hinders the ability of the Bay to support existing wildlife.
- # High priority should be given to the preservation of Suisun Marsh through adequate protective measures, including maintaining freshwater inflows.
- # The impacts of upstream freshwater diversions on inflow to the Bay should be monitored by the California State Water Resources Control Board (SWRCB).

3.1.4 WATER SURFACE AREA AND VOLUME

- # The surface area of the Bay and the total volume of water should be kept as large as possible to maximize active oxygen interchange, vigorous circulation, and effective tidal action. Filling and diking that reduce the surface area and volume of water should therefore be allowed only to provide substantial public benefits and only if there is no reasonable alternative.
- # Water circulation in the Bay should be maintained and improved as much as possible. Any proposed fills, dikes, or piers should be thoroughly evaluated to determine their effects on water circulation and modified as necessary to improve circulation or, at least, minimize any harmful effects.

3.1.5 MARSHES AND MUDFLATS

- # Salt marshes and mudflats should be maintained to the fullest extent possible to conserve fish and wildlife and to abate air and water pollution. Filling and diking that eliminate marshes and

mudflats should be allowed only to provide substantial public benefits and only if there is no reasonable alternative.

- # Any proposed fills, dikes, or piers should be thoroughly evaluated to determine their effects on marshes and mudflats and modified as necessary to minimize any harmful effects.
- # To offset possible additional losses from necessary filling and to augment the present marshes: (a) former marshes should be restored when possible by removing existing dikes; (b) in areas selected on the basis of competent ecological study, some new marshes should be created through carefully placed lifts of dredged spoils; and (c) the quality of existing marshes should be improved by appropriate measures whenever possible.

3.1.6 SALTPONDS AND OTHER MANAGED WETLANDS

- # As long as is economically feasible, the salt production in saltponds and the present use of wetlands should be maintained. The integrity of the salt production system should be respected (i.e., public agencies should not take, for other projects, any pond or portion of the pond that is a vital part of the production system).

3.1.7 SHORELINE PROTECTION

- # New shoreline erosion control projects and the maintenance or reconstruction of existing erosion control facilities should be authorized if: (a) the project is necessary to protect the shoreline from erosion, (b) the type of the protective structure is appropriate for the project site and the erosion conditions at the site, and (c) the project is properly designed and constructed.
- # Riprap revetments should be constructed of properly sized and placed materials that meet sound engineering criteria.
- # Authorized protective projects should be regularly maintained according to a long-term maintenance program to ensure that the shoreline will be protected from tidal erosion and that the effects of the necessary erosion control project on natural resources during the life of the project will be minimized.
- # Shoreline protective projects should, where feasible, include provisions for nonstructural methods, such as marsh vegetation.

3.2 SUISUN MARSH PROTECTION PLAN

The Suisun Marsh Protection Plan (San Francisco Bay Conservation and Development Commission 1976) sets forth the following policies relevant to CALFED programmatic-level actions that may occur within Suisun Marsh.

3.2.1 Environment

- # Habitat diversity in Suisun Marsh and the surrounding upland areas should be preserved and enhanced wherever possible to maintain the unique wildlife resources.
- # The waterways, managed wetlands, tidal marshes, seasonal marshes, and lowland grasslands are critical habitats for marsh-related wildlife and are essential to the integrity of Suisun Marsh; therefore, these habitats deserve special protection.
- # Existing uses should continue in the upland grasslands and cultivated areas surrounding the critical habitats of Suisun Marsh to protect the marsh and preserve valuable marsh-related wildlife habitats. Where feasible, the value of the upland grasslands and cultivated lands as habitat for marsh-related wildlife should be enhanced.
- # The eucalyptus groves in and around Suisun Marsh, particularly those on Joice and Grizzly Islands, should not be disturbed.

3.2.2 WATER SUPPLY AND QUALITY

- # Water quality standards in Suisun Marsh should be met by maintaining adequate inflows from the Delta.
- # Projects designed to import or redistribute the fresh water in the marsh for salinity control should be planned carefully so that the expected benefits are realized. Any proposed import project should be studied to determine whether the project would adversely affect the marsh by encouraging urban and industrial growth in the marsh area. No import project should be constructed if the adverse environmental impacts of growth on the marsh would outweigh the possible beneficial impacts of salinity control.
- # Groundwater to supplement surface flows may be used to prevent crop damage in some areas. Withdrawal of groundwater from the underground aquifers should not be so extensive as to allow the saltwater of the marsh to intrude into freshwater aquifers or to disrupt the natural subsurface flow of groundwater into the marsh.

- # Disruption or impediments to runoff and streamflow in the Suisun Marsh watershed should not be permitted if either would result in adverse effects on the quality of water entering the marsh. Riparian vegetation in the immediate Suisun Marsh watershed should be preserved and stream modification permitted only if it is necessary to ensure the protection of life and existing structures from floods.
- # Municipal, industrial, and agricultural discharges should be monitored to ensure that adequate water quality in Suisun Marsh is maintained.
- # Existing and new agricultural drainage systems should meet all applicable State and federal water quality standards. All discharge permits for agricultural drains should be based on a thorough study of the effects of the outflow, flushing, and mixing patterns in Suisun Bay and Suisun Marsh to guarantee that no adverse impact on the marsh results from any discharge.
- # Industrial facilities adjacent to or upstream of the marsh should not be developed if they have the potential to cause significant threats to water quality in the marsh. Activities at industrial facilities that could significantly alter the temperature, salinity, or turbidity of the water should be prohibited.

3.2.3 UTILITIES, FACILITIES, AND TRANSPORTATION

- # Whenever construction occurs within wetlands, it should be confined to the dry months (generally mid-April through mid-October) to minimize disturbance of wetland vegetation, wintering migratory waterfowl, other water birds, or nesting resident birds.
- # In water areas (bays and sloughs), dredging should be scheduled to avoid major fish migration periods.
- # All plans for construction within the marsh should be reviewed by the California Department of Fish and Game (DFG) to ensure that impacts on marsh flora and fauna of construction methods and timing are minimized.
- # Suisun channel dredging and any other dredging in marsh waterways should meet the following requirements: dredging should be for water-oriented uses or other important public purposes; the materials to be dredged should meet the water quality requirements of the San Francisco Bay RWQCB; and important marsh fisheries, wildlife, and their habitats should be protected.
- # Dredged materials in the marsh should be disposed in nontidal areas where, consistent with policies of the Suisun Marsh Protection Plan, the materials can be used to help restore, enhance, or manage the marsh.

3.2.4 WATER-RELATED INDUSTRY

- # The Collinsville site extends approximately 8 miles from the Sacramento River north to Little Honker Bay. The Collinsville site is only part of an extensive shoreline area fronting on deep water that extends from Collinsville to Rio Vista. This area, with approximately 12.5 lineal miles of deep water frontage, represents an important part of the total Bay Area inventory of water-related industrial sites. The western portion of the Collinsville site area may be restored or enhanced provided that the restoration or enhancement program is carried out in a manner that will not preclude use of the eastern portion of the Collinsville site for water-related industry and port use. Specifically, any wetland restoration should be designed to allow for development and operation of marine terminals and marine terminal berths on the deepwater shoreline and allow access for the movement of waterborne cargo, materials, and products from the shoreline terminal to the upland, eastern portions of the site.
- # Remaining areas of lowland grassland and seasonal marsh on the Collinsville site should be preserved and, whenever possible, enhanced or restored for their intrinsic value as marsh-related wildlife habitat and to act as a buffer between the Suisun Marsh and industrial and port activities. Dredged materials may be used in any wetland enhancement or restoration program when such activity will be conducted without adverse environmental impacts on the marsh.

3.2.5 LAND USE AND MARSH MANAGEMENT

- # Managed wetlands, tidal marshes, lowland grasses, and seasonal marshes should be included in a primary management area. Within the primary management area, existing uses should continue and both land and water areas should be protected and managed to enhance the quality and diversity of habitats.
- # Tidal marshes in the primary management area should be preserved.
- # The water management schedule developed by the U.S. Department of Agriculture Natural Resources Conservation Service and DFG and ratified by the Solano County Mosquito Abatement District should be used to the maximum extent possible in the managed wetlands.
- # Burning in the primary management area should be kept to a minimum to prevent uncontrolled fires that might destroy beneficial plant species and damage peat leaves and to minimize air pollution.
- # Water should be impounded to create or maintain a permanent pond only under the following situations: in deep ponds that are difficult to drain and manage as seasonally flooded marshes, in limited shallow areas where habitat diversity is desired, and in areas of high salinity

concentrations. Water levels in permanent ponds should be kept constant and water circulated to control mosquitos.

- # The upland grasslands and cultivated lands surrounding the marsh should be included in a secondary management area. The secondary management area should function as a buffer, insulating the habitats within the primary management area from adverse impacts of urban development, other land uses, and land practices incompatible with preservation of the marsh.

- # Wetland resources on portions of the Collinsville site may be enhanced or restored consistent with Suisun Marsh Protection Plan policies on water-related industries.

- # Where feasible, historical marshes should be returned to wetland status, whether as tidal marshes or managed wetlands.

- # Any proposed development in the Suisun Marsh watershed or secondary management area where there are poor soil conditions for construction or that is seismically active should be controlled to prevent or minimize earth disturbance, erosion, water pollution, and hazards to public safety.

- # Riparian vegetation in the immediate Suisun Marsh watershed should be preserved because of its importance in maintaining water quality and its value as marsh-related wildlife habitat. Stream modification should be permitted only if proven necessary to ensure the protection of life and existing structures from floods and only the minimum amount of modification necessary should be allowed.

3.3 MCATEER-PETRIS ACT

The McAteer-Petris Act (Sections 66600 et seq. California Government Code) sets forth the following policies relevant to CALFED programmatic-level actions that may involve placing fill; extracting materials; or changing the use of any land, water, or structure within the area of BCDC's jurisdiction:

- # Further filling of the San Francisco Bay and specific waterways should be authorized only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses, such as ports, water-related industries, airports, bridges, wildlife refuges, water-oriented recreation and public assembly, water intake and discharge lines for desalination and power-generating plants requiring large amounts of water for cooling purposes, or minor fill for improving shoreline appearance or public access to the Bay.

- # Fill in the Bay and specific waterways should be authorized only when no alternative upland location is available for such purpose.

- # The water area authorized to be filled should be the minimum necessary to satisfy the purpose of the fill.
- # Priority use areas should be protected, and maximum feasible public access should be provided with proposed projects.
- # The nature, location, and extent of any fill should be such that harmful effects on the Bay Area, such as the reduction or impairment of the volume, surface area, or circulation of water; water quality; fertility of marshes; or fish or wildlife resources, would be minimized.
- # Public health, safety, and welfare require that fill be constructed in accordance with sound safety standards that will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood- or stormwaters.
- # Fill should be authorized when it would, to the maximum extent feasible, establish a permanent shoreline.

The term “specific waterways” refers to all areas subject to tidal action on or tributary to the listed portions of the following waterways: (1) Plummer Creek in Alameda County to the eastern limit of the saltponds; (2) Coyote Creek (and branches) in Alameda and Santa Clara Counties to the easternmost point of Newby Island; (3) Redwood Creek in San Mateo County to its confluence with Smith Slough; (4) Tolay Creek in Sonoma County to the northerly line of Sears Point Road (State Route 37); (5) Petaluma River in Marin and Sonoma Counties to its confluence with Adobe Creek, and San Antonio Creek to the easterly line of the Northwestern Pacific Railroad right-of-way; (6) Napa River to the northernmost point of Bull Island; (7) Sonoma Creek to its confluence with Second Napa Slough; (8) Corte Madera Creek in Marin County to the downstream end of the concrete channel on Corte Madera Creek, which is located at USACE Station No. 318+50 on the Corte Madera Creek Flood Control Project.

4.0 PROGRAMMATIC DETERMINATION OF FEDERAL CONSISTENCY

This federal consistency determination consists of a general programmatic-level assessment of the CALFED Preferred Alternative, which comprises eight elements (Ecosystem Restoration Program, Water Quality Program, Water Use Efficiency Program, Water Transfer Program, Levee System Integrity Program, Watershed Program, Storage and Conveyance). This consistency determination begins by describing the programmatic actions in each of these programs that may affect San Francisco Bay or Suisun Marsh, then summarizes the programmatic consistency of those five programs with relevant policies contained in the San Francisco Bay Plan, the Suisun Marsh Protection Plan, and the McAteer-Petris Act.

4.1 PROGRAMMATIC ACTIONS IN THE CALFED PREFERRED ALTERNATIVE THAT MAY AFFECT SAN FRANCISCO BAY OR SUISUN MARSH

4.1.1 CALFED ECOSYSTEM RESTORATION PROGRAM

The Ecosystem Restoration Program is likely to directly affect the coastal zone resources within the jurisdiction of BCDC because its geographic sphere includes Suisun Marsh and portions of San Francisco Bay. The Suisun Marsh/North San Francisco Bay Ecological Zone is the westernmost zone described in the ERP and consists of five ecological units: Suisun Bay and Marsh, Napa River, Sonoma Creek, Petaluma River, and San Pablo Bay.

The overall CALFED vision for the Suisun Marsh/North San Francisco Bay Ecological Zone includes providing a more natural freshwater outflow pattern from the Delta in dry and normal rainfall years, restoring tidal and nontidal wetlands, restoring tidal perennial aquatic habitat, and screening unscreened and poorly screened diversions. These changes will assist in the recovery of special-status species and increase important fish, wildlife, and plant communities.

Within the Suisun Bay and Marsh Ecological Unit of this zone, ERP actions focus on restoring tidal action to selected managed wetlands and promoting the natural riparian and wetland succession in Suisun Marsh. Shallow-water, wetland, and riparian habitats in Suisun Marsh and along the shoreline of Suisun Bay will be protected and improved, where possible. Brackish marsh areas will be restored and protected. Upland habitats adjacent to riparian and wetland habitats also will be protected and improved. Efforts will focus on increasing the acreage open to tidal flows (e.g., by removing or opening levees) and providing connectivity between habitat areas to aid in the recovery of species such as the salt marsh harvest mouse, clapper rail, and black rail. Aquatic species, including chinook salmon, striped bass, delta smelt, splittail, and other estuarine resident fish in Suisun Marsh and Suisun Bay, will benefit from improving Suisun Marsh and the slough habitats.

Diverting water from Suisun Marsh channels for use in managed nontidal wetlands will continue, as will operation of the salinity control structure on Montezuma Slough; however, consideration for maintaining the natural hydrologic regime and salinity levels of the slough and marsh will be incorporated into these actions. Entrainment of juvenile fish will be minimized through efforts to screen diversions. Existing water quality standards will be met in the marsh.

Suisun Marsh and Suisun Bay will function as high-quality spawning and rearing habitat and an effective fish migration corridor. A healthy Suisun Marsh-Bay ecosystem will be an important link in the estuary foodweb, improving primary and secondary productivity. Suisun Marsh and Bay productivity will improve as freshwater inflows in dry and normal years and the acreages of tidal wetlands and associated tidal and perennial aquatic habitats increase.

In the Napa River Ecological Unit, restoration efforts will be focused in the Napa Marsh Wildlife Area, Cullinan Ranch, and Scaggs Island and will include habitat protection and restoration of large, contiguous areas of tidal, saline, emergent wetland, riparian, and upland habitats. Restoring tidal action will improve water quality and enhance the health of the marsh, which will aid in the recovery and enhancement of terrestrial and aquatic species.

In the Sonoma Creek Ecological Unit, existing habitats will be maintained and current and future restoration efforts in the Napa/Sonoma Marsh will be expanded. Opening leveed managed marshland to tidal action will create larger, more contiguous marsh areas to support terrestrial and aquatic habitats.

In the Petaluma River Ecological Unit, Petaluma Marsh and its associated tidal slough network will be expanded. In the San Pablo Bay Ecological Unit, the ecological health of San Pablo Bay and its function as an important nursery for marine, estuarine, and anadromous fish can be enhanced by increasing freshwater inflow, protecting and expanding tidal marsh/slough habitat complexes along the margins of the bay, and reducing the input of pollutants into the bay.

4.1.2 CALFED WATER QUALITY PROGRAM

The principal objective of the CALFED Water Quality Program is to provide high-quality water for urban, agricultural, industrial, environmental, and recreational beneficial uses. The Water Quality Program has developed strategies to address water quality problems in the Delta and its tributaries. Action strategies include source control measures (such as BMP's) treatment measures, and land fallowing and land retirement programs, water recycling, source water blending, and groundwater storage programs.

The legally defined Delta, Suisun Bay to Carquinez Strait, and Suisun Marsh compose the primary geographic focus of the Water Quality Program; however, because areas outside the Delta are sources of water quality problems that affect the Delta, its inhabitant species, and users of Delta water, the Water Quality Program recommends that actions be taken throughout the entire geographic solution area as necessary. This area encompasses a large portion of California, and includes all of the areas within BCDC's jurisdiction.

4.1.3 CALFED WATER USE EFFICIENCY PROGRAM

The CALFED Water Use Efficiency Program does not describe any specific actions that would directly affect coastal resources within the San Francisco Bay segment of the California coastal zone; however, increases in the efficiency of water use have the potential to beneficially affect water resources across the Bay and Delta Regions.

4.1.4 CALFED WATER TRANSFER PROGRAM

The Water Transfer Program does not include any actions that would directly affect coastal resources within the San Francisco Bay portion of the coastal zone, e.g. water would not be transferred from coastal zone areas to other areas. Redistribution of water among users could indirectly affect the Bay through changes in water distribution schedules. The total amount of water transferred and exported that would otherwise have been Delta outflow is likely to be extremely small compared to total outflows.

However, it is not possible to accurately estimate at the current programmatic level the degree to which redistribution among users would occur.

4.1.5 CALFED LEVEE SYSTEM INTEGRITY PROGRAM

The CALFED Levee System Integrity Program, while mostly focused on Delta actions, includes an investigation to determine the feasibility of CALFED participation in the rehabilitation of Suisun Marsh levees. Rehabilitation of levees could include reconstructing portions of the levees, expanding bases of the levees and engineering techniques that reduce erosion and susceptibility to seepage and subsidence. Most levee work is carried out on the landward side, to avoid impacts to waterways. Levee actions would coordinate with ERP actions to enhance the ecosystem while increasing levee protection, when feasible. While landward-side levee work could reduce managed wetlands, ERP actions associated with this work would more than offset any such impacts by creating new shallow-water habitat. If dredging were chosen as a method of providing materials for levee reconstruction, waterside impacts could result. However, dredging is subject to permits and permit conditions which would prohibit dredging unless very stringent environmental criteria were met. At this time, it is not possible to predict the source of materials for potential levee work.

4.1.6 CALFED WATERSHED PROGRAM

Activities associated with the Watershed Program would mostly occur in the upper reaches of Bay-Delta tributaries, and would not directly impact areas in BCDC's jurisdiction. Upstream watershed improvements in Bay tributary streams could result in positive benefits to Bay water quality. While the primary focus of the Program is on upstream areas, funding could be provided to community-based watershed groups which work within BCDC's jurisdiction. Projects undertaken by such groups can include education and outreach, streamflow enhancements, biodiversity maintenance and improvement, and watershed training for local government.

4.1.7 CALFED STORAGE ELEMENT

Any new storage could change Delta outflow, but variations would not be significant compared to current outflows. Modeling results for new storage show that differences between the Program with storage included and the No Project Alternative are within the current range of uncertainty associated with the No Project Alternative. Storage within the Preferred Program Alternative would reduce annual Delta outflows by 340-700 TAF (2.3% to 4.7%), out of a total average outflow of 14.8 MAF.

Greater seawater intrusion into the Bay could occur, with increases in salinity. The Preferred Program Alternative would increase the average monthly X2 position by about .6 km in September, and may increase or decrease the average monthly X2 position by about .3 km in March. Sufficient information does not currently exist to determine if statistically-small percentage reductions in Delta outflows would

have any discernible environmental effects in the Bay. This question would be studied during the environmental reviews for any specific storage project.

New storage dedicated to environmental water supplies could enhance seasonal flow for biological communities and species in the Bay. One option for EWA water stored in the Delta is that it can be left to provide increased Delta outflow.

4.1.8 CALFED CONVEYANCE ELEMENT

The Preferred Program Alternative provides for a through-Delta water conveyance plan. No actions are contemplated within the San Francisco Bay portion of the coastal zone. The Bay region could be affected by reduced Delta outflow, but any reduction would be very slight compared to total annual outflows to the Bay (see 4.1.7 above). Potential impacts of any flow reductions would be studied at the time environmental reviews would be carried out for new conveyance projects.

4.2 DETERMINATION OF PROGRAMMATIC CONSISTENCY

Table 1 summarizes the consistency of the CALFED Preferred Alternative with the San Francisco Bay Plan, the Suisun Marsh Protection Plan, and the McAteer-Petris Act and indicates that the Preferred Alternative is consistent with these policies at a programmatic level.

This section provides a more detailed description of the consistency of the CALFED Preferred Alternative with these policies and provides information supporting this conclusion. Because the Preferred Alternative is defined in programmatic terms, its consistency has been determined by comparing its actions with the policies listed in Section 3.0, "Management Program for the San Francisco Bay Segment of the California Coastal Zone", where possible. The consistency of the Preferred Alternative with specific policies could not be determined at the programmatic level because sufficient detail about actions contained in the Preferred Alternative is not yet available. The following determination of consistency is organized by the eight elements of the CALFED Preferred Alternative for ease of understanding, but it should be noted that the Preferred Alternative must be judged as a whole rather than as individual pieces.

4.2.1 ECOSYSTEM RESTORATION PROGRAM

Table 2 lists the programmatic actions contained in the ERP that are designed to achieve CALFED's objectives in the Suisun Marsh/North San Francisco Bay Ecological Zone and indicates the consistency of each action with BCDC's policies.

The CALFED Ecosystem Restoration Program is consistent at a programmatic level with the San Francisco Bay Plan's policies regarding fish and wildlife, water quality, freshwater inflow, water surface

Table 1. Summary of Consistency of the CALFED Preferred Alternative with BCDC Policies

	Ecosystem Restoration Program	Water Quality Program	Water Use Efficiency Program	Levee System Integrity Program	Storage/ Conveyance
San Francisco Bay Plan					
Fish and wildlife	Consistent	Consistent	Not directly applicable Potential indirect beneficial effects	Not applicable	Consistency cannot be determined at program-level
Water quality	Consistent	Consistent	Not directly applicable Potential indirect beneficial effects	Not applicable	Consistency cannot be determined at program-level
Freshwater inflow	Consistent	Consistent	Not applicable	Consistent	Consistency cannot be determined at program-level
Water surface area/volume	Consistent	Consistent	Not applicable	Not applicable	Not applicable
Marshes and mudflats	Consistent	Consistent	Not applicable	Not applicable	Consistency cannot be determined at program-level
Shoreline effects	Consistency cannot be determined at program-level	Consistency cannot be determined at program-level	Not applicable	Not applicable	Consistency cannot be determined at program-level

	Ecosystem Restoration Program	Water Quality Program	Water Use Efficiency Program	Levee System Integrity Program	Storage/ Conveyance
Suisun Marsh Protection Plan					
Environment	Consistent	Consistent	Not directly applicable Potential indirect beneficial impacts	Consistent	Not applicable
Water supply and quality	Consistent	Consistent	Not directly applicable Potential indirect beneficial impacts	Not applicable	Consistency cannot be determined at program-level
Utilities/facilities/ transportation	Consistency determined at project level	Consistency determined at project level	Not applicable	Not applicable	Not applicable
Water-related industry	Consistency determined at project level	Consistency determined at project level	Not applicable	Not applicable	Not applicable
Land use/marsh management	Consistent	Consistent	Not applicable	Not applicable	Not applicable
McAteer-Petris Act	Consistency cannot be determined at program level	Consistency cannot be determined at program level	Not applicable	Not applicable	Not applicable

Table 2. Consistency of ERP Programmatic Actions with BCDC Policies

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
Central Valley streamflow	As ecosystem improvements increase spring and summer flows from upstream areas into reservoirs, develop a cooperative program to allow these flows to pass downstream into and through the Delta. (This action would result from recommendations for spring flow events and minimum flows from upstream ecological zones)	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Natural floodplain and flood processes	Convert leveed lands to tidal wetland/slough complexes.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Bay-Delta aquatic foodweb	Actions described to restore streamflow, floodplains, tidal wetlands and sloughs, and riparian habitat would increase primary and secondary productivity in the Suisun and North San Francisco Bay areas.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Tidal perennial aquatic	Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Develop a cooperative program to evaluate the feasibility of restoring shallow-water habitat in the San Pablo Bay Ecological Unit.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Nontidal perennial aquatic	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas in restored saline emergent wetland habitats in the Suisun Bay Ecological Unit.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas in restored saline emergent wetland habitats in both the Sonoma Creek and Petaluma River Ecological Units.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
Saline emergent wetland	Develop 1,600 acres (includes above two actions) of deeper open-water areas to provide resting habitat for water birds, foraging habitat for diving ducks and other water birds that feed in deep water.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Seasonal wetland	Develop a cooperative program to acquire, in fee-title or through a conservation easement, 7,500-12,000 acres for tidal restoration, and complete the needed steps to restore the wetlands to tidal action.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Support the cooperative program to improve management of up to 26,000 acres of degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit. Support the development of a cooperative program to improve management of up to 32,000 acres of existing seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Develop a cooperative program to acquire, in fee-title or through a conservation easement, 1,000-1,500 acres of existing farmed baylands and restore tidal action.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Develop a cooperative program to acquire 100 acres of vernal pools and 500 to 1,000 acres of adjacent buffer areas (buffers could be in any category).	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
	Protect 6,200 acres of existing saline emergent wetlands in the Suisun Bay and Marsh Ecological Management Zone.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Tidal Sloughs	Restore slough habitat for fish and associated wildlife species. Restore 35 miles of slough habitat in the near-term, and 70 miles of slough habitat in the long-term.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
Riparian and riverine aquatic	Coordinate with landowners and managers to restore and maintain 10 to 15 linear miles of riparian habitat along corridors of riparian scrub and shrub vegetation in each of the ecological units, of which 60% is more than 15 yards wide and 25% is no less than 5 yards wide and 1 mile long.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Perennial grassland	Develop a cooperative program to restore 5,000 acres of perennial grasslands by acquiring conservation easements or purchasing land from willing sellers.	Programmatically consistent with policies regarding fish and wildlife, freshwater inflow, water quality, and wetlands. Project-level consistency determination for policies pertaining to construction, dredging and fill activities.
Delta smelt	Restoration of delta smelt will come indirectly from increasing March to May Delta inflow and outflow, improving Delta water temperature, improving Delta channel hydraulics, improving the Delta aquatic foodweb, improving aquatic wetland, and riparian habitats, and reducing stressors including effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Longfin smelt	Restoration of longfin smelt will come indirectly from: improved Delta inflow and outflow, improving the Delta aquatic foodweb, improving aquatic wetland, and riparian habitats, and reducing stressors including the effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Splittail	Restoration of splittail will come indirectly from higher late-winter Delta inflow, improving the Delta aquatic foodweb, improving aquatic wetland, and riparian habitats, and reducing stressors including effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Sturgeon, green and white	Sturgeon restoration will come indirectly from increased streamflows, improving the Delta aquatic foodweb, and reducing stressors including effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Chinook salmon (general)	Chinook salmon population restoration will come indirectly from increasing late winter and spring Delta inflow and outflow, improving Delta channel hydraulics, improving the Delta aquatic foodweb, increasing shallow water, riparian, and wetland habitats in the Delta, and reducing stressors including effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
Striped bass	Restoring striped bass will come indirectly from increasing late winter and spring Delta inflow and outflow, improving Delta channel hydraulics, improving the Delta aquatic foodweb, increasing shallow water, riparian, and wetland habitats in the Delta, and reducing stressors including effects of water diversions and contaminants.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
American shad	Restoration of American shad populations will come indirectly from increasing spring fresh water inflow to the Bay-Delta and improving the Delta aquatic foodweb.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Resident fish species	Restoration of native resident species will come from improved aquatic habitats and foodweb	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Marine/estuarine fishes and large invertebrates	General programmatic actions that will contribute to the target include improving winter/spring Delta outflow, restoring tidal wetland habitat, improving the aquatic foodweb, reducing losses of larvae and juvenile marine/estuarine fishes at water diversions in the Bay and Delta, limiting the introductions of non-native species, and reducing the input of toxic substances into Central Valley waterways.	Programmatically consistent with fish and wildlife policies, freshwater inflow policies, and water quality policies.
Swainson's hawk	Restore riparian woodlands and improve wildlife habitat values on agricultural lands. (Note: Please refer to the implementation objectives, targets and programmatic actions in the Habitat section of the Sacramento-San Joaquin Delta Ecological Zone for acreages and general areas for restoration of riparian, perennial grassland, and agricultural lands.)	Programmatically consistent with wildlife policies.
California clapper rail	Restoring tidal emergent wetland habitat would indirectly benefit California clapper rail population.	Programmatically consistent with wildlife policies.
California black rail	Restoring tidal emergent wetland habitat would indirectly benefit California black rail population.	Programmatically consistent with wildlife policies.
Suisun song sparrow	Restoring tidal wetlands and improved riparian habitat will benefit this species.	Programmatically consistent with wildlife policies.

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
Giant garter snake and western pond turtle	Restoration of new habitats in historical wetlands, grasslands, and upland areas will aid in the recovery of these species.	Programmatically consistent with wildlife policies.
Lange's metalmark, delta green ground beetle, VELB	Habitat restoration will contribute to the recovery of these species.	Programmatically consistent with wildlife policies.
Salt marsh harvest mouse	Restoring salt marsh habitat in San pablo and Suisun Bays and adjacent marshes, and new and improved salt marsh habitat in the north Bay and adjacent marshes will help in recovery of this species.	Programmatically consistent with wildlife policies.
Shorebird and wading bird guild	Shorebirds and wading birds will indirectly benefit from restoration of wetlands and tidal and non-tidal perennial aquatic habitat.	Programmatically consistent with wildlife policies.
Waterfowl	Waterfowl will indirectly benefit from restoring sloughs, wetlands, riparian, and tidal and non-tidal perennial aquatic habitat.	Programmatically consistent with wildlife policies.
Water diversion	Develop a cooperative program to consolidate, screen, or eliminate diversions in the Suisun Marsh/North San Francisco Bay Ecological Zone.	Programmatically consistent with fish and wildlife policies.
Invasive aquatic plants	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-end sloughs and channels in each ecological unit so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants within 10 years.	Programmatically consistent with fish and wildlife, and general environmental policies.
Invasive riparian and salt marsh plants	Develop a cooperative program to remove and suppress invasive non-native plants that compete with native riparian vegetation by reducing the area occupied by these species (such as giant reed and eucalyptus) by 50%.	Programmatically consistent with fish and wildlife, and general environmental policies.
	Develop a cooperative approach to develop control measures for perennial pepperweed.	Programmatically consistent with fish and wildlife, and general environmental policies.
	Develop a cooperative program to eliminate invasive woody plants from restoration sites to protect native riparian vegetation.	Programmatically consistent with fish and wildlife, and general environmental policies.
Invasive aquatic organisms	Fund additional inspection staff to enforce existing regulations.	Programmatically consistent with fish and wildlife, and general environmental policies.

Table 2. Continued

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
	Help fund research on ballast water treatment techniques that could eliminate non-native species before ballast water is released.	Programmatically consistent with fish and wildlife, and general environmental policies.
	Provide funding to the California Department of Food and Agriculture to expand or establish, as appropriate, a comprehensive program to exclude, detect, and manage invasive aquatic species such as zebra mussel, purple loosestrife, and hydrilla.	Programmatically consistent with fish and wildlife, and general environmental policies.
Predation and competition	Limit striped bass supplementation to life stages that minimize predation on juvenile anadromous and estuarine fish.	Programmatically consistent with fish and wildlife policies.
	Cooperatively develop an ecologically based approach to limit striped bass and chinook salmon stocking in the Bay to areas and periods that will not increase predation rates on special-status species, such as longfin smelt and delta smelt, and other native fishes.	Programmatically consistent with fish and wildlife policies.
Contaminants	Reduce the impacts of herbicides, pesticides, fumigants and other agents toxic to fish and wildlife in the Suisun Marsh/North San Francisco Bay Ecological Management Zone.	Programmatically consistent with water quality policies.
Harvest of fish and wildlife	Provide additional funding to California Department of Fish and Game (DFG) for additional enforcement.	Programmatically consistent with fish and wildlife policies.
	Provide additional funding to county sheriff's departments and State and local park agencies to support additional enforcement efforts.	Programmatically consistent with fish and wildlife policies.
	Provide rewards for the arrest and conviction of poachers, and develop and implement a public outreach/education program regarding the illegal harvest.	Programmatically consistent with fish and wildlife policies.
Disturbance	Develop a cooperative program with local agencies to establish and enforce zones prohibiting boat wakes within 50 yards of California black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June.	Programmatically consistent with fish and wildlife policies.

Table 2. Continued

Ecosystem Element	Programmatic Action	Programmatic Federal Consistency Determination
<p>Develop a cooperative program with local agencies to establish and enforce zones prohibiting motorized boats in 5 miles of dead-end channels in Suisun Marsh and San Francisco Bay from March to June</p>		<p>Programmatically consistent with fish and wildlife policies.</p>
<p>Develop a cooperative program with local agencies to establish and enforce zones prohibiting motorized boats in new, small channels in restored tidal fresh emergent wetlands</p>		<p>Programmatically consistent with fish and wildlife policies.</p>

area and volume, marshes and mudflats, and saltponds and other managed wetlands described above. The determination of consistency with shoreline effects must be made at the project level because these policies are fairly project specific. Specific mitigation measures for potential impacts, such as siltation during construction, will also be addressed at the project level.

The Ecosystem Restoration Program is consistent at a programmatic level with the Suisun Marsh Protection Plan policies pertaining to environment, water supply and quality, and land use and marsh management. The policies regarding utilities, facilities, and transportation are project specific and future consistency determinations on these policies will be provided at the project level. Additionally, it is too speculative at a programmatic level to assess consistency with the policies regarding water-related industry because there are no project-specific actions now planned near the Collinsville site. A consistency determination related to these policies will be made, as appropriate, at the project level in the event that restoration or enhancement actions are proposed at the Collinsville site.

The McAteer-Petris Act policies pertain primarily to dredging and fill activities in the San Francisco Bay area. The Ecosystem Restoration Program is consistent at a programmatic level with the policies that state that further filling in the San Francisco Bay area should be for water-oriented uses (e.g., wildlife) and that the nature, location, and extent of any fill should minimize harmful effects on water and wildlife resources in the San Francisco Bay area. Actions under the Ecosystem Restoration Program involving fill would be designed to enhance wildlife and aquatic resources; however, as with other policies in the San Francisco Bay Plan and the Suisun Marsh Protection Plan, more detailed assessment of consistency with these policies is appropriately determined at the project level (e.g., construction in accordance with safety standards).

Under BCDC's statutes, there are three coastal resource areas for which the effects of CALFED actions must be identified: vegetation and wildlife, water quality, and water inflow/quantity. The effects of implementing ERP actions on these three resource areas are described below. Where there is the potential for significant adverse impacts resulting from implementation of the CALFED programmatic actions, these impacts, as well as potential mitigation measures, are discussed.

4.2.1.1 BENEFICIAL EFFECTS ON VEGETATION AND WILDLIFE. Implementing ERP actions would result in beneficial effects on vegetation and wildlife as a result of the restoration of aquatic habitat and adjacent communities, including riparian, shallow-water, and tidal marsh habitats. Other beneficial effects will result from actions (including establishing dredging guidelines, implementing plans to reduce erosion attributable to boat wakes, reducing input of contaminants upstream and in San Francisco Bay) that reduce stresses on the processes and structure of those communities. The Environmental Water Account (EWA) will provide instream flows when they are critical for flow-dependent species. Primary beneficial effects include restored sediment supply and movement processes; restored natural structural characteristics of the San Francisco Bay system; and restored biological productivity through increased production, reduced stress on production processes, and increased input of organic carbon.

Additionally, reoperation of reservoir and diversion facilities may provide Delta outflows that protect and enhance the ecological functions and processes that operate within the Bay. Flow changes

could benefit all Bay species. Beneficial impacts on species include increases in the abundance of spawning and rearing habitat and increases in species survival as a result of reductions in levels of contaminants and potential increases in the availability of food.

Implementing ERP actions is expected to result in the following beneficial effects:

- # **Increase in Open-Water and Wetland Habitat Area.** Implementing ERP actions would substantially increase the area of wetland habitats in the Bay Region, including brackish water habitat in Suisun Marsh. Specific benefits would include increased availability of suitable breeding and/or foraging habitat for waterfowl and water birds, shorebirds, and wading birds dependent on the Delta.
- # **Increase in Riparian Communities.** Implementing ERP actions would substantially increase the area of riparian habitats in the Bay Region. Specific benefits would include increased availability of suitable breeding and/or foraging habitat for a number of birds, mammals, reptiles, and amphibians.
- # **Improved Wetland Habitat Quality.** Implementing ERP actions would improve the quality of as many as 14,000 acres of existing degraded diked saline emergent and seasonal wetland habitat areas. Approximately 81 species of wildlife in the Bay Region could benefit.
- # **Improved Habitat Patterns.** Implementing ERP actions would create a historical pattern of open-water, wetland, riparian, and grassland habitats in the Bay Region. Restoring wetlands near agricultural lands would create a pattern that could potentially increase the distribution of Bay Region wildlife.
- # **Improved Connectivity of Riparian Habitat.** Implementing ERP actions would restore up to approximately 60 miles of riparian habitat along channels and sloughs. Restoring habitat would increase the connectivity between existing fragmented riparian areas in the Bay Region.
- # **Increase in Habitats for Special-Status Species.** Aquatic, riparian, and some grassland habitats would be improved as a result of implementing ERP. Special-status species would benefit from these habitat improvements.
- # **Expansion of Rare Natural Communities and Significant Natural Areas.** The increase in quantity, quality, and connectivity of aquatic, riparian, and grassland habitats through implementation of the ERP would provide similar increases in most of the Bay Region's rare natural communities and significant natural areas.

4.2.1.2 BENEFICIAL EFFECTS ON FRESHWATER INFLOWS. Implementing ERP actions would also have beneficial effects on freshwater inflows to San Francisco Bay, Suisun Marsh, and Suisun Bay. One of the fundamental objectives of the ERP is to restore basic hydrologic conditions to Central Valley

streamflows to reactivate and maintain ecological processes that create and sustain habitat required for healthy fish, wildlife, and plant populations. The CALFED programmatic action to implement this objective is to develop a cooperative program to provide target flows in dry and normal years by allowing inflows to major storage reservoirs to pass downstream into and through the Delta. To further this goal, the Environmental Water Account will be used to provide instream flows at critical times for flow-dependent species. Although intended primarily to benefit in-Delta fisheries, EWA water could provide water quality benefits to the Bay by increasing Delta outflows. Restoring freshwater flows into the Suisun Marsh/North San Francisco Bay Ecological Zone consistent with natural hydrologic conditions in the Bay-Delta watershed will help restore fundamental ecosystem processes and functions for the north Bay's aquatic and wetland resources.

4.2.1.3 POTENTIALLY SIGNIFICANT ADVERSE IMPACTS/MITIGATION MEASURES RELATED TO VEGETATION AND WILDLIFE. Implementing the ERP could result in the temporary loss or degradation of wetland and riparian communities during construction, although the ultimate aim of the program is to significantly improve habitats in the Bay Region. This potential impact is considered significant because temporary decreases in the area of and disturbance to these communities could adversely affect approximately 82 species of wildlife associated with wetlands and 114 species of wildlife associated with riparian habitat in the Bay Region (including Suisun Marsh and Bay and northern San Pablo Bay). Potential mitigation strategies for reducing temporary impacts on wetland and riparian communities could include avoiding wetland and riparian habitats, creating wetland and riparian habitats in nonwetland/riparian habitat areas to offset temporary habitat losses, and restoring disturbed wetland and riparian vegetation immediately following construction activities.

4.2.1.4 POTENTIALLY SIGNIFICANT ADVERSE IMPACTS/MITIGATION MEASURES RELATED TO WATER QUALITY. The ERP involves restoration of approximately 150,000 acres of terrestrial and aquatic wildlife habitat. Up to 22,000 acres of the restored habitat could be created in the Bay Region, particularly in the Suisun Marsh and North Bay (see Table 2). Two categories of potential effects on water quality are associated with implementing ERP programmatic actions: immediate water quality impacts resulting from construction activities and long-term water quality impacts.

Habitat restoration would involve large-scale construction operations affecting considerable areas of land and water. Large-scale construction activities could have adverse effects on water quality. Construction activities in waterways could greatly increase local water turbidity and, depending on the source of the material used for levee construction, could cause the release of nutrients, natural organic matter, and toxicants into the water column. Construction in areas of dry land could result in similar substances being washed into waterways during storms and other periods of high flow. Short-term local adverse changes in water quality in the immediate vicinity of construction sites can be expected, but it is not expected that regional-level water quality or beneficial uses would be affected by construction activities.

Implementing ERP actions would improve long-term water quality in a number of areas. Land conversion from agricultural uses to wildlife habitat in the Bay Region, particularly lands adjacent to Suisun Bay and Marsh, San Pablo Bay, the Napa and Petaluma Rivers, and Sonoma Creek, would reduce

discharges of soil particles, nutrients, and pesticides into the waters of the Bay-Delta system, resulting in a beneficial effect on instream water quality. The input of salts would remain about the same as under existing conditions, although salt concentrations in Delta channels and other waterways would increase as a result of increased evaporation rates on Delta islands converted to year-round wetland habitats. It is not yet known whether total organic carbon (TOC) discharges would increase or decrease as a result of habitat restoration. If TOC discharges increase, then the TOC content of Delta waters would rise, making them less suitable as a source of drinking water. Restoration of riparian corridors and emergent wetlands would increase shading of water surface. Water temperatures in small tributary streams would decrease. The exclusion of livestock from riparian areas may reduce the microbial content of stream waters and increase their suitability for water-contact recreation and as a raw water supply source.

Large-scale construction activities will be chosen to minimize adverse environmental impacts. Any short-term adverse changes in water quality are expected to be less than significant because they would be temporary, reversible, and local.

A potential long-term adverse water quality effect of ERP could be an increase in water salinity attributable to increased evaporation where agricultural croplands are converted to wildlife habitat; however, salinity could also be decreased on these lands due to reduction or elimination of salts applied through fertilizers. Also, long-term water quality benefits would result from the decreased discharge of nutrients and pesticides to the waters of the Bay-Delta system.

If conversion of agricultural land into aquatic habitat increases the TOC content of Bay-Delta system waters, the suitability of this water for use as drinking water would decrease and the cost of water treatment would increase; however, any adverse effects could be mitigated by locating at least some aquatic habitat restoration projects in areas where increases in TOC discharges would not affect drinking water diversions or by treatment of peat soils to reduce TOC discharges.

4.2.2 WATER QUALITY PROGRAM

The Water Quality Program is programmatically consistent with the water quality policies of the San Francisco Bay Plan and the Suisun Marsh Protection Plan. The source controls (e.g., BMPs) and treatment methods described in the program are designed to address water quality problems in the Delta associated with urban and industrial runoff, municipal and industrial wastewater, and agricultural drainage. These actions will have beneficial effects on water quality. The policies of the McAteer-Petris Act do not apply to this program because fill activities in the San Francisco Bay area are not being contemplated as a part of this program.

4.2.3 WATER USE EFFICIENCY PROGRAM

The Water Use Efficiency Program is programmatically consistent with the policies of the San Francisco Bay Plan and the Suisun Marsh Protection Plan. Although no specific actions are proposed that

would directly affect coastal zone resources within the jurisdiction of BCDC, local efforts designed to increase water use efficiency are expected to have beneficial effects on water resources. The polices of the McAteer-Petris Act do not apply to this program because fill activities in the San Francisco Bay area are not being contemplated as a part of this program.

4.2.4 WATER TRANSFER PROGRAM

The Water Transfer Program consists of administrative actions that would not directly affect areas within the jurisdiction of the BCDC. Changes in flow amount from the Program would not likely be significant (see Section 4.1.4). Thus, the Program would be consistent with the San Francisco Bay Plan and the Suisun Marsh Protection Plan. The polices of the McAteer-Petris Act do not apply to this program because fill activities in the San Francisco Bay area are not being contemplated as a part of this program.

4.2.5 LEVEE SYSTEM INTEGRITY PROGRAM

The current Levee System Integrity Program includes work only in the Delta, and would have no direct physical construction impacts on the Coastal Zone. Rehabilitation of levees in the Suisun Marsh area may be added to the Program, subject to a feasibility report. Should Suisun Marsh levees be added to the Program, reconstruction efforts in the Suisun Marsh area could result in short- and long-term adverse effects due to habitat encroachment and loss. These impacts can be reduced or mitigated by setting back levees and constructing channel-side berm and levee remnants, which would allow development of natural marsh communities, and produce beneficial impacts on aquatic characteristics.

Waterside construction activities could result in short-term effects on water quality. Local increases in TSS content of adjacent waters can be expected, with increases in TOC also possible. Toxic substances contained in old levees or channel sediments could be released during waterside work or dredging. A number of mitigation measures relating to construction practices can reduce potential water quality impacts, including: use of cofferdams to isolate construction sites from waterways; using sediment curtains to contain sediment plumes during dredging; avoiding construction activities during periods of fish presence; and using best management practices to control erosion and sedimentation.

By using best management practices and other mitigations, as well as by creating additional marsh habitat, potential levee program actions to protect Suisun marshes and infrastructure would be consistent with the Suisun Marsh Protection Plan, the San Francisco Bay Plan and the McAteer-Petris Act.

4.2.6 WATERSHED PROGRAM

Most Watershed Program activities would not have direct, physical effects on the Coastal Zone. Program actions would, however, have beneficial impacts to the Bay through upstream activities that improve Bay water quality, result in a closer approximation of natural flows, and restore natural sediment delivery and movement. If Program activities are funded for watersheds within the jurisdiction of the

BCDC, they would be community-based, and would work with all local environmental protection laws and regulations, such as those administered by BCDC. Any on-the-ground projects within the BCDC jurisdiction would use mitigation measures similar to those described for the Ecosystem Restoration Program.

The CALFED Watershed Program is consistent at a programmatic level with the San Francisco Bay Plan's policies regarding fish and wildlife, water quality, freshwater inflow, water surface area and volume, marshes and mudflats, and saltponds and other managed wetlands described above. The determination of consistency with shoreline effects must be made at the project level because these policies are fairly project specific. Specific mitigation measures for potential impacts, such as siltation during construction, will also be addressed at the project level.

The McAttee-Petris Act policies pertain primarily to dredging and fill activities in the San Francisco Bay area. The Watershed Program is consistent at a programmatic level with the policies that state that further filling in the San Francisco Bay area should be for water-oriented uses (e.g., wildlife) and that the nature, location, and extent of any fill should minimize harmful effects on water and wildlife resources in the San Francisco Bay area. Actions under the Watershed Program involving fill would be designed to enhance wildlife and aquatic resources, stream health and water quality; however, as with other policies in the San Francisco Bay Plan and the Suisun Marsh Protection Plan, more detailed assessment of consistency with these policies is appropriately determined at the project level (e.g., construction in accordance with safety standards).

Watershed Program activities are not anticipated to occur in the Suisun Marsh; thus there would be no inconsistencies with the Suisun Marsh Protection Plan.

4.2.7 STORAGE

The Storage Investigation and potential development of storage facilities would not have a direct physical effect on the San Francisco Bay portion of the Coastal Zone, as no construction will occur within the Coastal Zone. By intercepting flows that would otherwise have flowed through the San Francisco Bay, however, flow amounts that reach the Bay may be reduced. Depending upon storage options chosen, between 340 and 700 TAF could be retained as a result of storage.

This flow reduction is not anticipated to result in significant environmental impacts to the Bay ecosystem, based on:

- C Operations criteria are in place that will maintain minimum Delta outflow during the critical February through May period;
- C The change in outflow (2.3%-4.7% decrease) is small relative to the variability in outflow from month-to-month and year-to-year;

C The change in outflow is partially attributable to capture of flow during high-flow conditions that will minimize the effects on ecosystem processes.

Additional project-level studies will be conducted as part of the planning for any storage projects to determine potential impacts to the Bay. Program activities to increase understanding of Delta outflow effects and the related shifts in salinity on organisms in the Delta and Bay are included in the ERP Strategic Plan and CALFED Science Program (CMARP).

Also, additional flows could be available from the Environmental Water Account, created through new storage, which would benefit anadromous and other species in the Bay region.

Because there are no direct impacts, because flow reduction impacts are not projected to be significant, and because additional flows may be available to benefit critical species at times when such flows are critical, the Storage Element would be consistent with the Suisun Marsh Protection Act, the San Francisco Bay Plan and the McAteer- Petris Act.

4.2.8 Conveyance- Preferred Program Alternative

The Preferred Program Alternative would implement a number of actions in the Delta that simultaneously are designed to improve water quality, allow for continued export, and allow for recovery of fish populations. No facilities would be contemplated in the San Francisco Bay portion of the Coastal Zone. Outflow reductions to the Bay are largely dependent on storage options chosen (see 4.2.7 above). As noted above, reduced flows to the Bay could range 340 to 700 TAF. This amount could be withheld from the average of 14.8 MAF that normally flow out of the Delta to the Bay, although flows historically have ranged between 4 to 70 MAF annually. In comparison to total annual flows, and given the probable timing of any flow reductions, the amount of reduction (2.3%-4.7%) is not significant, and would cause no adverse environmental impacts.

Because there are no direct impacts, because flow reduction impacts appear to be insignificant, and because additional flows may be available to benefit target species at times when such flows are critical, the Conveyance Element would be consistent with the Suisun Marsh Protection Act, the San Francisco Bay Plan and the McAteer- Petris Act.

4.3 CONCLUSION

The proposed CALFED Preferred Program Alternative programmatic actions are consistent with the Suisun Marsh Protection Act, the San Francisco Bay Plan and the McAteer-Petris Act. This will allow a finding by BCDC that the overall CALFED program is consistent with the Coastal Zone Management Act.

Of the proposed CALFED programs, only the Ecosystem Restoration Program and potentially the Levee System Integrity Program would have direct physical impacts on areas within the San Francisco Bay portion of the Coastal Zone. Both these programs are designed to improve the water quality of the Bay and to provide substantial enhancements for species inhabiting and transiting through the Bay region. Both Programs would mitigate any potential impacts in the Bay region.

The Storage and Conveyance elements of the CALFED Program may have some effects on X2 and estuary biota which depend on brackish marsh conditions. If winter flows to the Bay are reduced slightly due to increased storage or conveyance improvements, there is concern that salt marsh could expand at the expense of brackish marsh. Current information suggests that this would not occur. Such effects, however, cannot be measured or estimated at the current programmatic level of the Program, and will need to await additional monitoring and research information, both of which are proposed as part of the overall Program.

5.0 NEXT STEPS

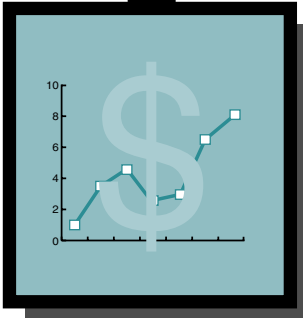
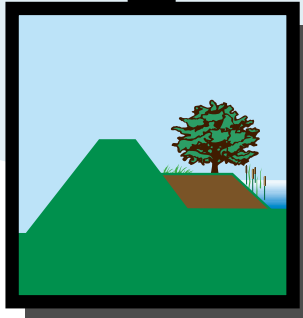
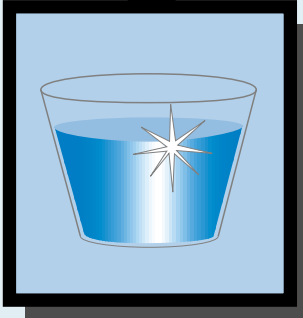
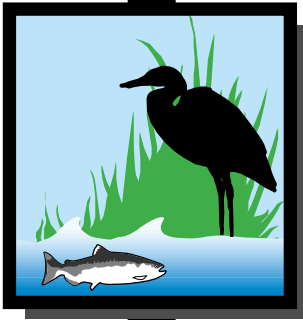
Project-specific actions, undertaken during Phase III of the CALFED process, may include federal agency involvement in projects proposing to deposit fill in; extract materials from; or change the use of water, land, or structures in or around San Francisco or Suisun Bays and therefore will require project-specific compliance with CZMA. Federal agencies may be required to prepare federal consistency analyses certifying that the proposed project-specific actions are consistent with BCDC's coastal zone management program. BCDC would either concur with the certifications or object to them (in the latter case the federal agencies must obtain approval from the secretary of commerce before the action commences). The environmental review for project-level actions that could affect coastal zone resources (requiring either the additional consistency analysis for federal actions or individual local coastal permits for nonfederal actions) will be tiered from the Programmatic EIS/EIR, and may be simplified because project descriptions of specific actions would already contain strategies (if necessary) to avoid and mitigate impacts on resources of the coastal zone.

6.0 REFERENCES

San Francisco Bay Conservation and Development Commission. 1969. San Francisco Bay Plan, as amended. January. San Francisco, CA.

San Francisco Bay Conservation and Development Commission. 1976. The Suisun Marsh Protection Plan. December. San Francisco, CA.

CALFED Bay-Delta Program. 1999. Draft Programmatic Environmental Impact Statement/Environmental Impact Report. June. Sacramento, CA.



CALFED
BAY-DELTA
PROGRAM

Attachment 10 Common Acronyms

August 28, 2000

Common Acronyms

A

AB	Assembly Bill
AFRP	Anadromous Fish Restoration Program
ASIP	Action-specific implementation plan
AWMC	Agricultural Water Management Council

B

Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta estuary
BCDC	San Francisco Bay Conservation and Development Commission
BDAC	Bay-Delta Advisory Council
BLM	U. S. Bureau of Land Management
BMPs	best management practices

C

CalEPA	California Environmental Protection Agency
CARA	Conservation and Reinvestment Act
CCFB	Clifton Court Forebay
CCWD	Contra Costa Water District
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CMARP	Comprehensive Monitoring Assessment and Research Program
COA	Coordinated Operations Agreement
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CZMA	Coastal Zone Management Act

D

DCC	Delta Cross Channel
DEFT	Diversions Effects on Fisheries Team
DFG	California Department of Fish and Game
DHS	California Department of Health Services
DO	dissolved oxygen
DWR	California Department of Water Resources
DWRSIM	DWR system operational model

E

E/I Ratio	Export/Inflow Ratio
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Endangered Species Act
EWA	Environmental Water Account
EWMP	efficient water management practices

F

FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FWCA	Fish and Wildlife Coordination Act
FWS	U.S. Fish and Wildlife Service

G

GLC	Grant Line Canal
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I

ISI	Integrated Storage Investigation
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J

JPOD	joint point of diversion
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L

LESA	NRCS Land Evaluation and Site Assessment
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M

“m” species	“maintains”
M&I	municipal and industrial
MAF	million acre-feet
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSCS	Multi-species Conservation Strategy
MWD	Metropolitan Water District of Southern California
Fg/L	micrograms per liter

N

NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NRCS	Natural Resources Conservation Service

O

Ops Group	California-Federal Operations Group
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P

PL	Public Law
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
Program	CALFED Bay-Delta Program

R

“R” species	“recovery”
“r” species	“contributes to recovery”
Reclamation	U.S. Bureau of Reclamation
ROD	Record of Decision

S

SB	Senate Bill
SJRA	San Joaquin River Agreement
SRF	State Revolving Fund
SWP	State Water Project
SWRCB	State Water Resources Control Board

T

TAF	thousand acre-feet
TBP	Temporary Barriers Program
TDS	total dissolved solids
TOC	total organic carbon

U

USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

UV Ultra violet

V

VAMP Vernalis Adaptive Management Plan

W

WMS Water Management Strategy
WUE Water Use Efficiency Program

X

X2 Location (measured in kilometers upstream from the Golden Gate Bridge) of 2 parts per thousand total dissolved solids

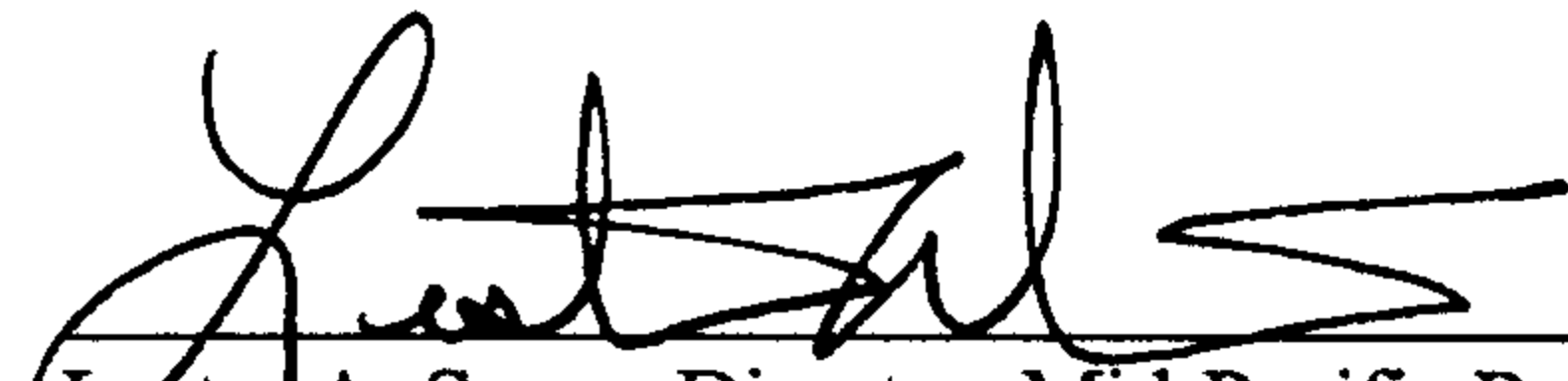
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yr year

Having considered the contents of this document, its attachments and the documents supporting this decision, we hereby adopt this Clean Water Act, Section 401 Memorandum of Understanding. By signing this document together, we exercise our respective authorities over only those portions relevant to our authority.

Signed and dated:


United States of America



Lester A. Snow, Director, Mid-Pacific Region
U.S. Bureau of Reclamation

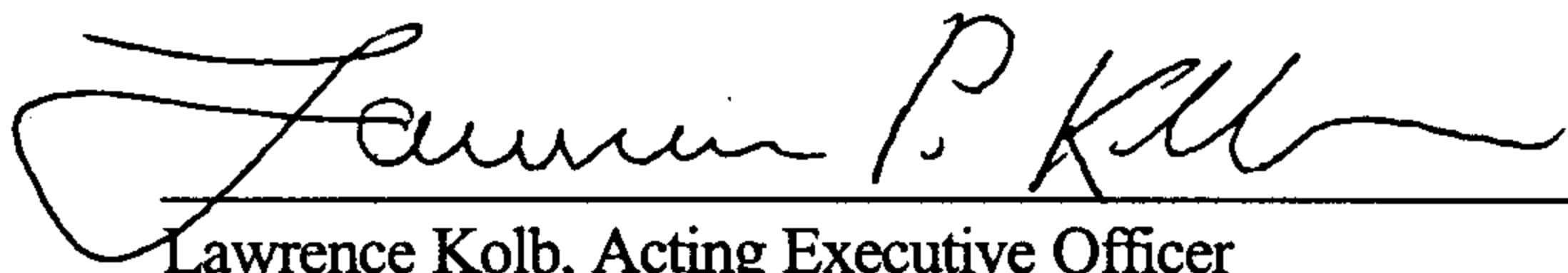
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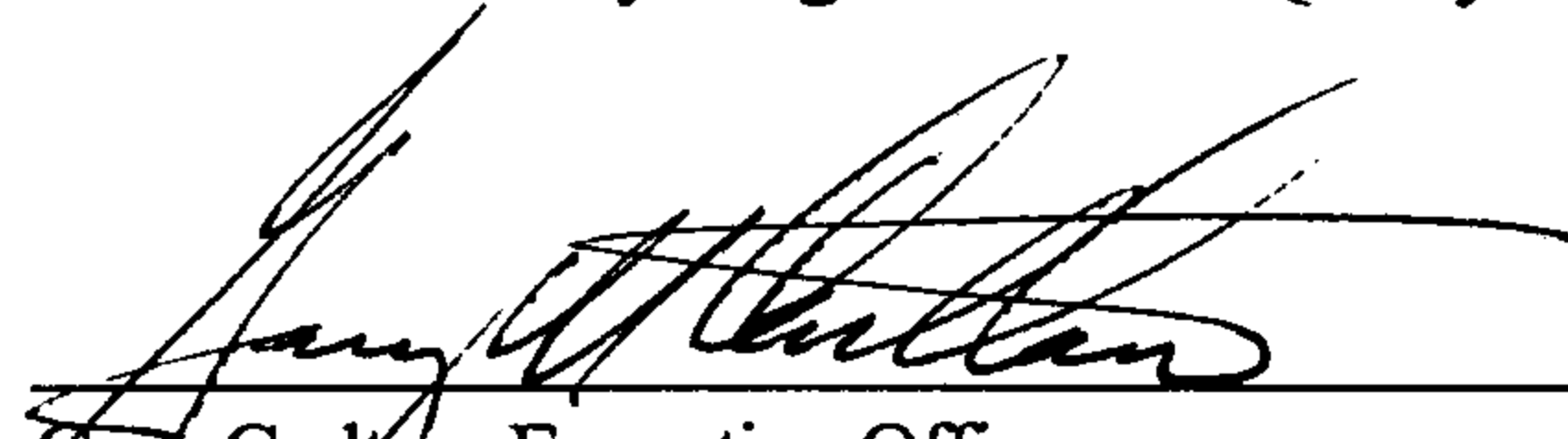
Ed Anton, Acting Executive Director
State Water Resources Control Board

8/28/00
Date




Lawrence Kolb, Acting Executive Officer
San Francisco Bay Regional Water Quality Control Board

8/23/2000
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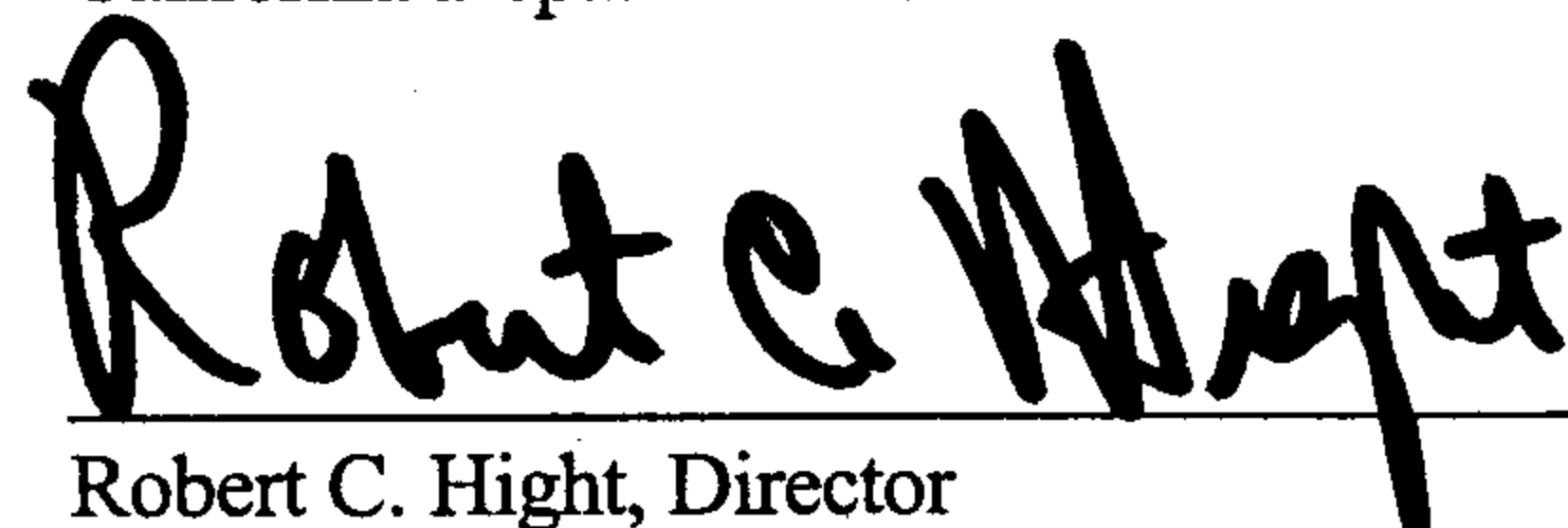
Gary Carlton, Executive Officer
Central Valley Regional Water Quality Control Board

24 Aug 2000
Date



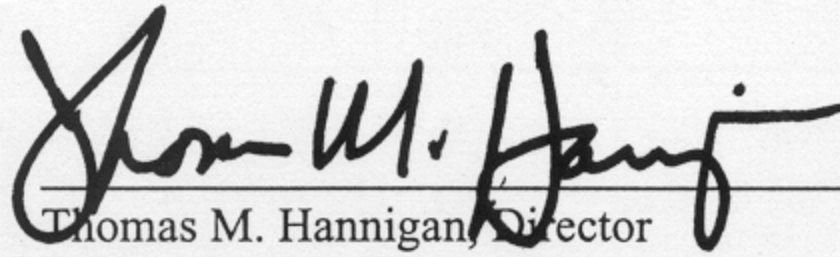
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California Department of Water Resources

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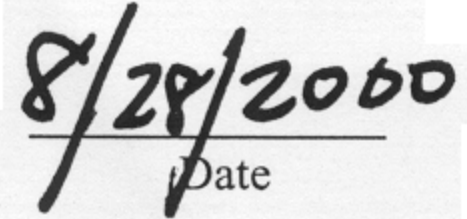


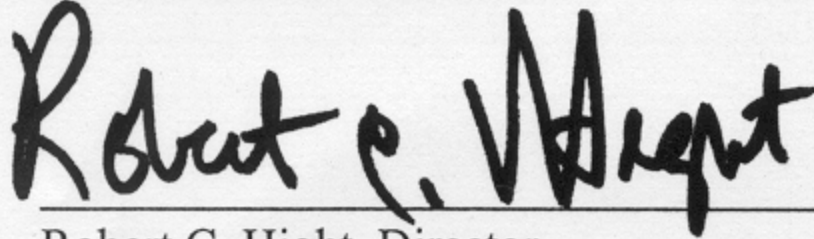
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California Department of Fish and Game

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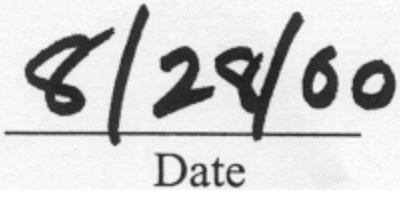


Thomas M. Hannigan, Director
California Department of Water Resources


Date



Robert C. Hight, Director
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Date