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Multi-Species Conservation Strategy. Draft Programmatic EIS/EIR Technical Appendix

CalFed Bay-Delta Program

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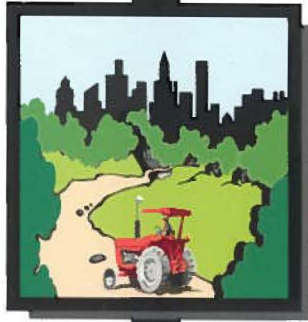


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CALFED
BAY-DELTA
PROGRAM

Multi-Species Conservation Strategy

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Draft Programmatic EIS/EIR Technical Appendix
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*CALFED Multi-species
Conservation Strategy*

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MSCS Technical Reports

The CD-ROM containing these reports may be acquired from CALFED by calling (916) 654-4458.

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Evaluation Tables and MSCS Conservation Measures for NCCP Communities

Glossary

The glossary identifies acronyms and abbreviations and defines terms used in the MSCS.

Acronyms and Abbreviations

Acronym	Full Meaning
AB	Assembly Bill
af	Acre-feet
ASIP	Action-specific Implementation Plan
BLM	U. S. Department of the Interior, Bureau of Land Management
BMP	Best Management Practice
CDFG	State of California, Resources Agency, Department of Fish and Game
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CMARP	Comprehensive Monitoring, Assessment, and Research Program
CNDDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CSC	California Species of Special Concern
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DCC	Delta Cross Channel
DWR	State of California, Resources Agency, Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERP	Ecosystem Restoration Program
ERPP	Ecosystem Restoration Program Plan
ESU	Evolutionarily Significant Unit
ESA	Endangered Species Act, usually referring to federal Endangered Species Act

Acronyms and Abbreviations

Acronym	Full Meaning
FESA	federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
HCP	Habitat Conservation Plan
IA	Implementing Agreement
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSCS	Multi-species Conservation Strategy
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NMFS	U.S. Department of Commerce, National Marine Fisheries Service
NEPA	National Environmental Policy Act
PEIS/EIR	Programmatic Environmental Impact Statement/Environmental Impact Statement
ROD	Record of Decision
SB	Senate Bill
SWP	State Water Project
USFWS	U. S. Department of the Interior, Fish and Wildlife Service
VAMP	Vernalis Adaptive Management Plan

Definitions

Term	Definition
acre-foot	the volume of water that would cover one acre to a depth of one foot, or 325,851 gallons of water. On average, 1 acre-foot could supply 1-2 households with water for a year. A flow of 1 cubic foot per second for a day is approximately 2 acre-feet
adequately conserved	to use, and the use of, conservation methods and procedures which are adequate to protect and perpetuate a species of fish, plant or wildlife within the focus area, taking into consideration the whole of the CALFED Program, including the direct and indirect effects of CALFED Program actions.

(continued)

Term	Definition
anadromous	pertaining to fish that spend a part of their life cycle in the sea and return to freshwater streams to spawn
Bay-Delta	the San Francisco Bay/Sacramento-San Joaquin Delta estuary
Best Management Practices	a water conservation measure that the California Urban Water Conservation Council agrees to implement among member agencies. The term is also used in reference to water quality standards, watershed management activities, and others.
biological opinion	the document that states the USFWS' opinion as to whether or not the federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat
CALFED	a consortium of 15 state and federal agencies with management or regulatory responsibilities for the Bay-Delta
candidate	any species being considered by the Secretary [of the U.S. Department of the Interior] for listing as an endangered or a threatened species, but not yet the subject of a proposed rule (50 CFR Section 424.02) or any species accepted as a candidate species by the California Fish and Game Commission pursuant to Fish and Game Code section 2074.2
Central Valley Project	federally operated water management and conveyance system that provides water to agricultural, urban, and industrial users in California. The CVP was originally authorized by legislation in 1937.
Central Valley Project Improvement Act	this federal legislation, signed into law on October 30, 1992, mandates major changes in the management of the federal Central Valley Project. The CVPIA puts fish and wildlife on an equal footing with agricultural, municipal, industrial, and hydropower users.
channel islands	natural, unveeved land masses within Delta channels that are typically good sources of habitat
conserve	“conserve,” “conserving,” and “conservation” mean to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to ESA and CESA are no longer necessary. These methods and procedures include, but are not limited to, all activities associated with scientific resources management, such as research, census, law enforcement, habitat acquisition, restoration and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.
“contribute to recovery”	also known as “r,” a type of goal assigned to those 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. A goal of contributing to a species’ recovery implies that CALFED will undertake some of the actions under its control within its MSCS Focus Area and Program scope necessary to recover the species.

(continued)

CALFED Multi-species Conservation Strategy

Term	Definition
conveyance	a pipeline, canal, natural channel or other similar facility that transports water from one location to another
covered species	at a programmatic level, species selected from the evaluated species, which would be adequately conserved (state requirement) and for which programmatic CALFED actions would not cause jeopardy and/or adversely affect critical habitat (federal requirement)
critical habitat	for listed species, consists of (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. [ESA Section 3(5)(A)] Designated critical habitats are described in 50 CFR Sections 17 and 226.
cumulative impact	the incremental impact or effect of the action together with impacts of past, present, and reasonable foreseeable future actions (regardless of the source of these other actions)
Delta Cross Channel	existing gated structure and channel connecting the Sacramento River at Walnut Grove to the North Fork Mokelumne River. The facility was constructed as part of the CVP to control movement of Sacramento River water into the central Delta and to the south Delta export pumps. Operating criteria currently requires the gates to be closed for specific periods to keep downstream migrating fish in the Sacramento River and to prevent flooding of the central Delta
Delta Islands	islands in the Sacramento-San Joaquin Delta protected by levees. Delta Islands provide space for numerous functions including agriculture, communities, and important infrastructure such as transmission lines, pipelines, and roadways
ecosystem	a recognizable, relatively homogeneous unit that includes organisms, their environment, and all the interactions among them.
emergent	a plant rooted in shallow water and having most of the vegetative growth above water
endangered species	any species [including subspecies] listed as endangered under the federal Endangered Species Act or the California Endangered Species Act
endemic	native or confined naturally to a particular and unusually restricted area or region
enhance	to improve degraded habitat
(continued)	

Term	Definition
environmental impact report	a detailed written report, required by the California Environmental Quality Act, analyzing the environmental impacts of a proposed action, adverse effects that cannot be avoided, alternative courses of action, and cumulative impacts
environmental impact statement	a detailed written statement, required by Section 102(2)(c) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance of long-term productivity, and any irreversible and irretrievable commitment of resources
ephemeral stream	a stream that flows seasonally
estuary	a water passage where ocean water mixes with river water
estuarine fish	fish that spend a part of their life cycle in an estuary
evaluated species	a species within the MSCS focus area that is federally listed as threatened or endangered or California-listed as rare, threatened, endangered, or fully protected; could become federally or California-listed as threatened or endangered during the term of CALFED implementation (at least 30 years) and could be adversely affected by CALFED actions; or CALFED actions could affect a substantial portion of the species' range or important habitat
facultative	not limited to a specific condition; having the ability to live under varying conditions, such as in a wetland and grassland
fish group	a classification which is based on ecological behavior of the included fish species. Two fish groups are evaluated in the Multi-species Conservation Strategy: anadromous fish and estuarine fish
Focus Area	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
habitat conservation plan	a comprehensive planning document that is a mandatory component of an incidental take permit pursuant to Section 10(a)(2)(A) of the Endangered Species Act
habitat goals	goals developed for the Ecosystem Restoration Plan that provide the basis for the Multi-species Conservation Strategy goals, building on those goals by looking at the needs of evaluated species. For habitats, the goals include acreage targets for habitat creation and enhancement.
incidental take	"take" of any federally or state-listed species that is not the purpose of otherwise lawful activities (see "take"); violation of Section 9(a)(1)(B) of the Endangered Species Act
incidental take permit	federal exemption to violation of Section 9 of the Endangered Species Act issued pursuant to Section 10(a)(1)(B) of the Endangered Species Act
invertebrate	an animal that lacks a backbone or spinal column
(continued)	

CALFED Multi-species Conservation Strategy

Term	Definition
listed species	species, including subspecies, of fish, wildlife, or plants listed at 50 CFR Section 17.11 and Section 17.12 as either endangered or threatened or species declared candidate, threatened or endangered by the California Fish and Game Commission and the federal fish and wildlife agencies
“maintain”	also known as “m,” a type of goal assigned to species expected to be minimally affected by CALFED actions. For this category, CALFED will mitigate any adverse effects to the species commensurate with the level of effect on the species; thus, actions may not actually contribute to the recovery of the species, but would be expected, at a minimum, to not contribute to the need to list a species or degrade the status of a listed species. CALFED will also maximize beneficial effects on these species to the extent practicable.
mitigation	to moderate, reduce, alleviate the impacts of a proposed activity; includes in order: a) avoiding the impact by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; e) compensating for the impact by replacing or providing substitute resources or environments
National Environmental Policy Act	federal legislation establishing the national policy that environmental impacts will be evaluated as an integral part of any major federal action (requires the preparation of an environmental impact statement for all major federal actions significantly affecting the quality of the human environment)
NCCP community	refers to both habitats and fish groups. The Multi-species Conservation Strategy provides the information for a programmatic Natural Community Conservation Plan for 20 natural communities, encompassing 18 habitat types and two ecologically based fish groups.
NCCP habitat or habitat type	broad habitat categories, each of which includes a number of habitat or vegetation types recognized in frequently used classification systems. The 18 NCCP habitats in the Multi-species Conservation Strategy include tidal perennial aquatic, Valley riverine aquatic, montane riverine aquatic, and lacustrine.
Natural Community Conservation Plan	A plan prepared pursuant to the Natural Community Conservation Planning Act (Fish and Game Code section 2800 <i>et seq.</i>) that identifies and provides for the regional or area-wide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth
Natural Community Conservation Planning Act	State of California legislation contained in Act (Fish and Game Code section 2800 <i>et seq.</i>)

(continued)

Term	Definition
obligate	limited to a restricted environment, such as a wetland
perennial	a plant that grows for more than one season; it overwinters in a dormant condition and resumes growth the following season
Phase I	During Phase I, begun in May 1995, the problems of the Bay-Delta were defined and work began on developing a range of alternatives to solve them; Phase I was completed in August 1996.
Phase II	CALFED is currently in Phase II, which will end at the time of the Final Programmatic Environmental Impact Statement/ Environmental Impact Report (PEIS/EIR). In Phase II, CALFED is developing a preferred program alternative, is conducting comprehensive programmatic environmental review, and is developing the implementation plan focusing on the first seven years (Stage 1) following the Record of Decision on the EIS/EIR.
Phase III	During Phase III, implementation of the Preferred Program Alternative will begin. It will continue in stages over many years. This phase will include any necessary studies and site-specific environmental review and permitting.
practicable	capable of being put into practice, done, or accomplished using reasonable means and costs
raptor	a bird species in the order Falconiformes such as hawks, eagles, kites, and falcons and in the order Strigiformes (owls)
recovery	also known as "R," a type of goal assigned to those species whose range is entirely or nearly entirely within the MSCS Focus Area affected by the CALFED Program and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. The term recover means the decline of a species is arrested or reversed, threats to the species are neutralized, and thus, the species' long-term survival in nature is assured.
restoration	a term sometimes used to imply the process of recreating the structural and functional configurations of an ecosystem to that present at some agreed to time in the past. Because the structure and function of many elements of the Bay-Delta ecosystem have been severely disrupted and cannot be feasibly restored to a specified historic condition, within the context of CALFED, ecosystem restoration is more realistically defined as the process by which resource managers ensure that the capacity of the ecosystem to provide ecological outcomes valued by society is maintained, enhanced, or restored.
riparian	the strip of land adjacent to a natural water course such as a river or stream. Often supports vegetation that provides the important fish habitat values when growing large enough to overhang the bank.
riverine habitat	within or alongside a river or channel

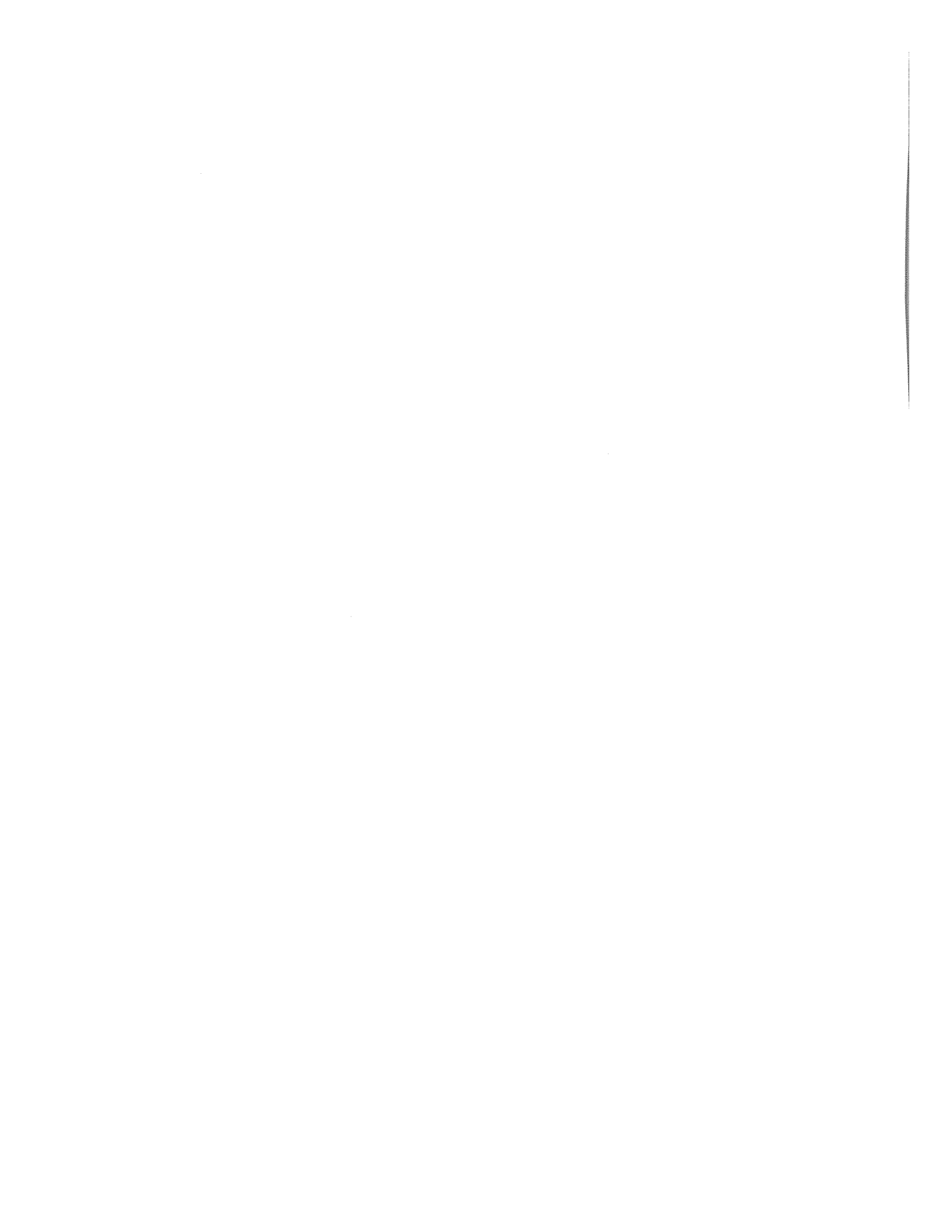
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CALFED Multi-species Conservation Strategy

Term	Definition
Section 7	section of the federal Endangered Species Act dealing with the requirement that federal agencies consult with the USFWS to insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species unless the agency has been granted an exemption listed in Section 7
Section 9	section of the federal Endangered Species Act dealing with prohibited acts, including the "take" of any listed species without specific authorization of the U.S. Fish and Wildlife Service
Section 10(a)	section of the federal Endangered Species Act dealing with exceptions to prohibited acts, like the permitting process of scientific purposes of incidental take
sensitive species	listed species, species that are candidates for listing, and other species that have been designated as sensitive species or species of special concern
service area	all of the areas that receive water from a particular water project
special status species	species that are in at least one of the following categories: federally listed as threatened or endangered under the ESA; proposed for federal listing under the ESA; federal candidates under the ESA; California listed as threatened or endangered under the CESA; California candidates under the CESA; plants listed as rare under the California Native Plant Protection Act; California fully protected species or specified birds under various sections of the California Fish and Game Codes; California species of special concern; California Native Plant Society List 1A, 1B, 2, or 3; or other native species of concern to CALFED
species	aside from those plants and animals considered to be species, Section 3(15) of the federal Endangered Species Act also "includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature"
species goal	goals recommended by the Multi-species Conservation Strategy Team and the Ecosystem Restoration Program Staff for the evaluated species, termed "Recovery," "Contribute to Recovery," and "Maintain"
species goal prescriptions	a performance standard to measure progress toward meeting the species goal by providing habitat or population targets
species of concern	species, including subspecies, of fish, wildlife, or plants other than federally and state-listed species (e.g., proposed, candidate) that may be affected by actions
stage	the height of the water surface above an arbitrarily established datum plane

(continued)

Term	Definition
Stage 1	the first seven years following the Record of Decision on the CALFED Program EIS/EIR
State Water Project	a California State water conveyance system that pumps water from the Delta for agricultural, urban domestic, and industrial purposes. The SWP was authorized by legislation in 1951.
subsidence	the settling of land due to the compaction of soil caused by loading, oxidation of organic soils, removal of underground fluids, or other mechanisms
take	"to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with regard to federally listed, endangered species of wildlife [Section 3(18) of the Endangered Species Act]. Regulations provide the same taking prohibitions for threatened wildlife species [50 CFR Section 17.31(a)]. "Harm" is further defined as an act "which actually kills or injures" listed wildlife. Harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter" (50 CFR Section 17.3). Under the Fish and Game Code, take is defined as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Take also pertains to plants under the Federal Endangered Species Act and California Endangered Species Act.
threatened species	any species listed as threatened under the federal Endangered Species Act or the California Endangered Species Act
vernal pool	a type of temporary wetland that forms where a layer of impermeable clay exists below a layer of permeable soil and allows water to saturate the ground
water transfers	voluntary water transactions conducted under state law and in keeping with federal regulations
Watershed Program Area	areas within the watershed of the San Joaquin/Sacramento system, located above major dams; the Watershed Program Area does not include the MSCS focus area
Wildlife Agencies	U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game



Executive Summary

1: Introduction

The CALFED Program was established to reduce conflicts in the Bay-Delta system by solving problems in ecosystem quality, water quality, water supply reliability, and levee system integrity. Implementing these actions will have a complex range of effects, including impacts to plants and animals listed under the Federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) and other sensitive species. This Multi-species Conservation Strategy (MSCS) builds on the Ecosystem Restoration Program (ERP) to provide a framework for compliance with the ESA, CESA, and a second California law also dealing with listed species, the Natural Community Conservation Planning Act (NCCPA).

Most measures described in the MSCS will be implemented in the MSCS focus area (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 areas discussed in the MSCS include the Watershed Program Area (areas within the watershed of the San Joaquin/Sacramento system, but located outside the MSCS focus area). The species covered by the MSCS are those that will be adequately conserved under the CALFED Program.

This framework identifies the habitats and species that could be affected by CALFED actions, analyzes how the CALFED Program actions will affect them and proposes mitigation measures that will provide for compliance with the laws covering protected species and their habitats at a programmatic level. The MSCS mitigation measures build on the programmatic actions presented in the ERP. Additional, site-specific details are required for legal compliance when implementing specific CALFED Program actions or groups of actions.

The MSCS is a part of the CALFED Bay-Delta Program. The environmental consequences of implementing the MSCS are described in the PEIS/EIR in

conjunction with the analysis of the Program as a whole. At a programmatic level, the environmental effects of implementing the conservation measures in the MSCS are within the parameters of the environmental effects described in the PEIS/EIR for implementing the various CALFED common programs and the associated mitigation strategies. Additional environmental review of individual CALFED Program actions will tier from the PEIS/EIR and provide further detail about the environmental effects of implementing MSCS conservation measures.

2: Natural Communities and Evaluated Species

The ERP and this MSCS address natural communities and the species that depend on them. The MSCS serves as the programmatic NCCP for 20 natural communities, encompassing 18 habitat types and 2 ecologically based fish groups. The 18 habitat types are broad habitat categories, developed using scientifically accepted habitat nomenclature and maintaining consistency with the ERP. The 18 habitat types covered under the MSCS are: tidal perennial aquatic, valley riverine aquatic, montane riverine aquatic, lacustrine, saline emergent, tidal freshwater emergent, nontidal freshwater permanent emergent, natural seasonal wetlands, managed seasonal wetlands, valley/foothill riparian, montane riparian, grassland, inland dune scrub, upland scrub, valley/foothill woodland and forest, montane woodland and forest, upland cropland and seasonally flooded agricultural land.

Fish habitat is not easily identified using terrestrial habitat classifications because fish habitat is dependent on dynamic factors primarily related to water flow. Therefore, two fish groups are evaluated in the MSCS based on the ecological behavior of the included fish species: anadromous fish and estuarine fish. The 18 NCCP habitat types encompass the habitats used by these fish species, except the open ocean.

Special-status species in the context of the MSCS were defined: as any species listed as threatened or endangered, proposed for listing or candidates for listing under the ESA and the CESA; California fully protected species; rare plants listed under the California Native Plant Protection Act; and rare plants listed on California Native Plant Society (CNPS) Lists 1A, 1B, 2 or 3 that may be present in the MSCS focus area shown on Figure 1-1. Over 400 special-status species were identified as known or with the potential to occur within the focus area. From that comprehensive list, a refined subset of 243 species was selected for evaluation in the MSCS, based on their overall status and the potential for the CALFED Program to affect them. Important factors in creating the evaluated species list included whether the species is legally protected from take or could become legally protected during CALFED Program implementation, if CALFED could affect a substantial portion of the species'

range or important habitat, and if the species is of specific concern to CALFED. Covered species are evaluated species that will be adequately conserved by implementation of the MSCS and the ERP.

Many species that are not explicitly evaluated in the MSCS will nevertheless benefit from the ERP actions and MSCS measures through the resulting enhancement of their habitats.

3: Species and Habitat Goals

The MSCS conservation goals for evaluated species fall into three categories: recovery ("R"), contribute to recovery ("r"), and maintain ("m"). The species in the recovery category have a range which falls largely within the ERP and MSCS areas. Accordingly, the CALFED agencies plan to take most of the actions needed for the recovery of those species. In this context, "recovery" means ensuring long-term survival leading to the delisting of the species. For the CALFED Program, this goal may not be feasible for some species, mainly anadromous fish, threats to which extend beyond the scope of the CALFED Program. Nineteen species (1 mammal, 2 birds, 8 fish, 2 insects, and 6 plants) are in the "recovery" category. The CALFED Program only affects a limited portion of the range, or has only a limited effect on, the species in the "contribute to recovery" category. To the extent practicable and reasonable, this means implementing part of the recovery plan for those species where one exists, or taking actions which will benefit species that do not have a recovery plan. Twenty-five species (4 mammals, 1 reptile, 10 birds, 1 fish, 1 insect, and 8 plants) fall into the "contribute to recovery" category. The 199 remaining species are in the "maintain" category. For these species, the CALFED Program will not contribute to the decline of any species, listed or unlisted, and will endeavor to benefit them to the extent practicable.

The CALFED species goals, and the measures to achieve them, are based on existing recovery plans to the extent possible. The goals are outlined in the Ecosystem Restoration Program Plan (ERPP) and the ERP Strategic Plan. CALFED habitat goals developed for the ERP provide the basis for the MSCS goals, which build on the ERP goals by looking at the needs of evaluated species. For habitats, the goals include acreage targets for habitat creation and enhancement.

The long duration of the CALFED Program (at least 30 years) requires that its conservation plans be periodically reviewed and revised to reflect actual experience, and to ensure they are adapted to optimally meet their objectives. These objectives amount to restoring and maintaining natural species habitats, primarily in the Delta, relying largely on ecological processes. Goals and objectives both for species and habitats may be modified over time as portions

of the program are implemented and monitoring reveals changes in the conditions of species populations and habitats. A formal adaptive management program will be used to formulate the necessary changes.

4: CALFED Program Actions

The purpose of the CALFED 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 do so, CALFED will focus on four critical resource categories: ecosystem quality; water quality; water supply reliability; and levee system integrity. Important linkages exist between the problems and possible solutions in each of these categories. Accordingly, all four categories must be addressed concurrently: problems in one resource category cannot be pursued without addressing problems in the other resource categories.

The Preferred Program Alternative includes several strategies to achieve improvements in the Program's four critical resource categories. While many actions within the strategies are described in terms of regional implementation, the multiple benefits derived from water management actions are most clearly demonstrated if these actions are described in terms of coordinated water management throughout the Bay-Delta system. This coordinated implementation is referred to as the CALFED Water Management Strategy. Two critical parts of the continuing refinement of the Water Management Strategy include the Environmental Water Account and the Integrated Storage Investigation.

CALFED is guided by six "solution principles": (1) reduce conflicts in the system, (2) be equitable, (3) be affordable, (4) be durable, (5) be implementable and (6) pose no significant redirected impacts. The preferred solutions embodied in the CALFED Program are based on these principles.

The CALFED Program uses eight interrelated elements to address the four critical resource categories. These are Levee System Integrity, Water Quality, Ecosystem Restoration, Water Use Efficiency, Water Transfers, Watershed Programs, Storage Facilities (ground and surface water) and Through-Delta Conveyance Actions. The first of these proposes a five-part program to improve and then maintain levee system integrity. The second, water quality, aims to reduce levels of salinity, turbidity, inorganic and organic contaminants in drinking and agricultural water supplies, and to raise dissolved oxygen in flowing waters. The third, ecosystem restoration, seeks to improve and increase the natural habitats, to sustain and enhance the environments of their natural and human inhabitants. Particular attention will be given to the beneficial management of the Bay-Delta floodplains, and to preserving threatened fish

populations. The fourth, water use efficiency, reflects mandates for reasonable and efficient use of water, including specific actions to promote conservation and water recycling. The fifth, water transfers, will facilitate water transfers to ensure that water literally flows to its most valuable uses. Mechanisms to protect against third-party impacts are incorporated, including those affecting natural flows. The sixth, watershed programs, supports local watershed enhancement programs which also benefit the Bay-Delta system. The seventh, storage facilities, will be highly selective and will use ground water as well as expanded surface storage and power system reoperation. The eighth, through-Delta conveyance actions, will combine new intakes, diversions and operable barriers, and operational changes, all predicated on protection of fish populations in the Delta.

These CALFED Program actions will all conform to the adaptive management concepts being applied to the entire CALFED Program. Adaptive management is based on monitoring, assessment, and research, to provide continuous review and refinement as the CALFED Program proceeds. A staged implementation policy will enable each part of this Program to be evaluated, and modified as necessary, to ensure that it is consistent in practice with the goals of the overall CALFED Program.

5: Effects of CALFED Actions and Conservation Measures

The MSCS analyzes the potential benefits and adverse effects of implementing CALFED Program actions and MSCS conservation measures on NCCP communities and evaluated species within the MSCS focus area. Potential indirect impacts on NCCP communities and evaluated species that could result from implementation of CALFED Program measures to improve water supply reliability in service areas are not addressed in the MSCS. The approach to analyzing potential CALFED Program impacts and then developing conservation measures included: identifying the proposed Program actions and their impacts; formulating conservation measures to compensate for adverse impacts of the Program and to achieve species goals; evaluating the overall effect of implementing CALFED Program actions and conservation measures on NCCP habitats and evaluated species; and summarizing the effect of implementing Program actions and conservation measures throughout the focus area.

The MSCS provides a programmatic-level of analysis of potential beneficial and adverse effects, both direct and indirect (except indirect effects in service areas), of proposed CALFED Program actions. Potential impacts of implementing proposed CALFED Program actions were determined by analyzing activities that could cause an adverse effect on an NCCP habitat or result in harm or mortality to individual species. The MSCS analyzes potential

CALFED Multi-species Conservation Strategy

CALFED Program effects on each NCCP habitat and evaluated species. The impact on individual species is inferred from the impacts to its habitat.

Several extensive tables in this chapter present the impact analysis; one presents a summary of the effects on NCCP communities from implementation of the CALFED Program and conservation measures proposed in the MSCS. Other tables summarize the effects on evaluated species. Greater detail on impacts and conservation measures are provided in attachments to the MSCS. Extensive evaluation and detail are provided in separate technical reports available from CALFED on request.

Conservation measures were developed under the MSCS: 1) measures to avoid, minimize, or compensate for CALFED Program impacts on NCCP communities and evaluated species; and 2) additional measures that ensure the Program meets the species conservation goals. The majority of measures designed to help the Program meet the species conservation goals incorporate and refine existing ERP and other CALFED actions. The scope, location, and timing of a particular CALFED Program action or group of actions, as well as the current status, distribution, and needs of the affected species, will determine which conservation measures would be necessary to compensate for adverse impacts. NCCP habitat conservation measures are primarily directed at conserving the quality and quantity of natural habitats.

6: Relationship of the MSCS to Non-CALFED Projects, Programs, and Plans

The CALFED Program and 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. The CALFED Program will be consistent and synergistic with existing wildlife protection and recovery programs within its area of application. Existing efforts include Habitat Conservation Plans (HCPs) approved or under development; other conservation agreements; numerous biological opinions (programmatic and specific) addressing diverse actions within the area; and more than 20 Federal Energy Regulatory Commission (FERC) hydropower relicensing projects. In addition, the Central Valley Project Improvement Act (CVPIA) of 1992 provides for a broad range of habitat enhancement and species protection, much of it within the MSCS focus area. A further effort has been proceeding under SB 1086 to develop a management plan for the Sacramento River system, some of it already funded through CALFED. The CALFED Program must be consistent with all these existing efforts, and will endeavor, through its actions, to enhance their benefits to wildlife.

7: ESA, CESA, and NCCPA Compliance

CALFED will comply with ESA for adoption of the CALFED Program through programmatic Section 7 consultations with the USFWS and NMFS. The MSCS will serve as the biological assessment of the CALFED Program in support of the programmatic Section 7 consultations. The USFWS and NMFS will use the MSCS biological information and analysis to prepare programmatic biological opinions. The MSCS will also be submitted to CDFG for approval as a programmatic NCCP. The programmatic biological opinions and CDFG's NCCPA determination (collectively, "programmatic consultations") will be completed at the time of the CALFED Record of Decision (ROD). Neither the programmatic biological opinions nor the programmatic NCCPA determination will fully comply with the endangered species acts for individual Program actions or authorize take of the species covered in the MSCS. Instead, ESA, CESA, and NCCPA compliance, including any required take authorization for Program actions, will follow through a streamlined, action-specific consultation process that tiers from the MSCS and the programmatic consultations, or will be covered under existing biological opinions.

For each specific Program action or group of actions, the streamlined consultation process will establish compliance with the ESA, CESA, and the NCCPA on the basis of the information in the programmatic MSCS and the programmatic consultations. If such compliance is demonstrated and the proposed action is described in sufficient detail, biological data are adequate, and appropriate conservation measures are incorporated, a highly streamlined consultation can be achieved. If the proposed action is generally described in the MSCS, but not in sufficient detail to allow for take authorization under ESA Section 7 or the NCCPA, a less streamlined consultation will occur. Some additional information will be required for the necessary regulatory analysis, including assurance that the proposed action is consistent with other aspects of the MSCS. The consultation will necessarily be less streamlined because information is lacking on the action itself or biological data on covered species is inadequate. When the required information has been furnished, take authorization can be provided to the implementing entity.

8: Monitoring

Monitoring for the CALFED Program serves not only to facilitate compliance and gauge the effectiveness of CALFED actions, but also informs choices under adaptive management. Monitoring needs for the CALFED Program are being developed through CMARP. Specific monitoring needs of the MSCS include: (1) monitoring success in attaining CALFED's species and habitats goals, and (2) monitoring compliance with those measures required in the MSCS for ESA/CESA compliance and specified in any subsequent Section 7 consultation, Section 10(a)(1)(B) permit, NCCP, and/or Section 2081 authorization.

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Monitoring will document compliance with ESA/CESA requirements, becoming part of the CALFED permitting process. Subsequent monitoring of the outcome of these required actions will be an essential input to CALFED's adaptive management process.

Monitoring to determine the success of the CALFED Program in attaining the species and habitat goals will be incorporated as part of the CMARP habitats and species monitoring element. That monitoring program is being developed for: (1) evaluating of habitat restoration and connectivity and (2) assessing the capability of existing and restored habitat to support the covered species, and other native biota. The CALFED Program also will provide focused monitoring of population dynamics and behavior of particular species to detect their response to management actions.

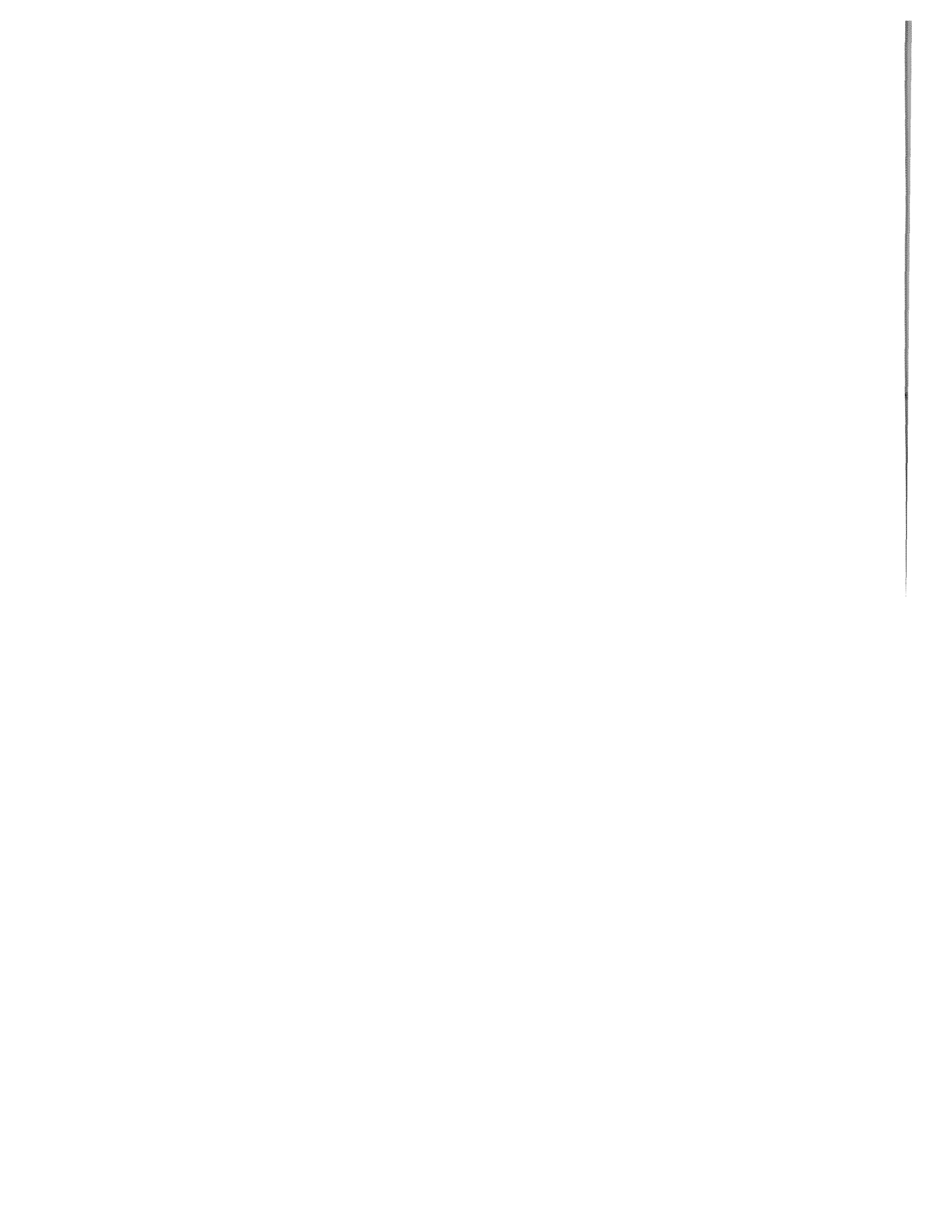
Progress toward goals for MSCS evaluated species will be measured primarily through monitoring the distribution and abundance of habitat types over time. This will involve use of a GIS and periodic capture of remotely sensed data. CMARP will be addressing these issues in the first stage of implementation. The requirements for monitoring in support of the MSCS will significantly affect the scope and substance of CMARP. While some on-going monitoring should address MSCS needs for fish and most other "R" and "r" species, additional effort will be required for most species. In many cases, particularly for "m" species, it is expected that CMARP habitat monitoring will provide sufficient information to assess the status of many species. However, specific monitoring for all species will be determined partially based upon the degree of effect the program actions are expected to have on the species.

9: Adaptive Management

Adaptive management is a key component of the CALFED Program. Data from monitoring programs will allow CALFED to determine whether its implementation of the MSCS for NCCP communities and evaluated species is meeting the CALFED Program goals. CALFED will then have an opportunity to adapt its management prescriptions as needed. Adaptive management for CALFED will include assessing management prescriptions embedded in the CALFED Program, implementing revised management strategies as needed, and conducting additional research. Thus, while CALFED Program goals for NCCP communities and evaluated species are expected to remain unchanged, the means used to achieve them can be revised based on the experience gained.

The MSCS will require periodic modification in response to new information. Modifications will reflect changes in the scope of Program actions, species

responses to the CALFED Program, effects of the MSCS conservation measures, and actual take.



1: Introduction

The CALFED Program was established to reduce conflicts in the Bay-Delta system by solving problems in ecosystem quality, water quality, water supply reliability, and levee system integrity. Implementing these actions will have a complex range of effects, including impacts to plants and animals listed under the Federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) and other sensitive species. This Multi-species Conservation Strategy (MSCS) builds on the Ecosystem Restoration Program (ERP) to provide a framework for compliance with the ESA, CESA, and a second California law also dealing with listed species, the Natural Community Conservation Planning Act (NCCPA).

Most measures described in the MSCS will be implemented in the MSCS focus area (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 areas discussed in the MSCS include the Watershed Program Area (areas within the watershed of the San Joaquin/Sacramento system, but located outside the MSCS focus area). The species covered by the MSCS are those that will be adequately conserved under the CALFED Program.

This framework identifies the habitats and species that could be affected by CALFED actions, analyzes how the CALFED Program actions will affect them and proposes mitigation measures that will provide for compliance with the laws covering protected species and their habitats at a programmatic level. The MSCS mitigation measures build on the programmatic actions presented in the ERP. Additional, site-specific details are required for legal compliance when implementing specific CALFED Program actions or groups of actions.

The MSCS is a part of the CALFED Bay-Delta Program. The environmental consequences of implementing the MSCS are described in the PEIS/EIR in conjunction with the analysis of the Program as a whole. At a programmatic level, the environmental effects of implementing the conservation measures in the MSCS are within the parameters of the environmental effects described in the PEIS/EIR for implementing the various CALFED common programs and the associated mitigation strategies. Additional environmental review of individual CALFED Program actions will tier from the PEIS/EIR and provide further detail about the environmental effects of implementing MSCS conservation measures.

1.1 Purpose of the MSCS

CALFED has developed this programmatic MSCS for the CALFED Program as the foundation for compliance with ESA, CESA, and NCCPA. The MSCS provides two specific pieces of information not found in other portions of the CALFED Program. First, the MSCS identifies a process for obtaining take authorizations for specific actions or groups of actions. This process is described in Section 7.2. Other parts of Chapter 7 describe how the process will be implemented.

Second, the MSCS presents two types of conservation measures: (1) measures designed to avoid, minimize, or compensate for potential CALFED Program impacts on NCCP communities and evaluated species; and (2) additional measures, beyond those required to mitigate for Program impacts, to ensure the Program meets the species conservation goals. These measures are summarized in Chapter 5, with details provided in the Attachments and Technical Reports cited in Chapter 5.

The MSCS:

- analyzes the effects of CALFED Program actions on species and habitats, at a programmatic level;
- identifies mitigation measures that may be required to adequately conserve each of the covered species; and
- provides a foundation for assurances and regulatory certainty that will be provided through the appropriate ESA, CESA, NCCPA, and other compliance mechanisms.

For Federal actions, compliance with the Federal ESA may be achieved through formal consultation pursuant to Section 7 of the Federal ESA. In this context, Federal actions are those activities funded, authorized, or carried out by a Federal agency. The MSCS provides the information for the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to prepare programmatic biological opinions under Section 7; but the detailed information required to analyze the impacts of specific CALFED actions will be provided in Action-specific Implementation Plans (ASIPs) that serve as project-level biological assessments (see Chapter 7). Incidental take will be authorized through the ASIP process.

To comply with California laws protecting sensitive species, authorization of incidental take would be achieved through the NCCPA, which includes the preparation of a Natural Community Conservation Plan (NCCP). The California Department of Fish and Game (CDFG) will consider the MSCS in conjunction with the ERP for approval as a programmatic NCCP for the CALFED Program. The ASIPs tier off the MSCS and contain the information

required for each action or group of actions. No incidental take authorizations will be issued at the programmatic level.

1.2 Relationship of the MSCS to the Ecosystem Restoration Program

CALFED will use the ERP to restore the environmental health of the Bay-Delta estuary. This goal, to be pursued over a period of at least 30 years, will emphasize the use of natural processes to reestablish a sustainable environment for plants, fish, and wildlife. This approach minimizes human intervention for habitat maintenance. With such a long-term program, of broad scope, it is unrealistic to set explicit implementation strategies for its duration at the outset. The ERP recognizes the uncertainties inherent in its mission and accordingly uses an adaptive management approach.

Implementation of the CALFED Program, including the ERP, will result in actions that impact species and their habitats. These actions must comply with the federal ESA and CESA where the impacts on species and habitats include impacts to species listed under the two acts or other sensitive species. The MSCS has been developed to ensure that the CALFED Program as a whole, and individual CALFED Program actions, comply with the endangered species laws.

1.3 CALFED Actions Considered in the MSCS

To make the MSCS clear, a broad understanding of the CALFED Program is needed, but comprehensive details are not. This section identifies the components of the CALFED Program to provide context for the discussion to follow. A fuller explanation, intended to provide background for the description of conservation measures and project impacts, is in Chapter 4. The Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/EIR) prepared for the CALFED Program provides a thorough description of the Program actions.

Major components of the CALFED Program are the:

- Ecosystem Restoration Program, designed to restore ecological processes associated with stream flow, stream channels, watersheds, and floodplains that are essential to the survival of species dependent on the Delta;
- Water Quality Program, designed to improve the water quality in the Bay-Delta system and to support all beneficial uses of water, including drinking water supply, recreation, agricultural and industrial water supply, and protection and enhancement of aquatic life;
- Water Use Efficiency Program, offering support and incentives for increasing the efficient use of water supplies through planning, technical, and financial assistance;

- Levee System Integrity Program, intended to increase the stability and structural integrity of project and non-project Delta levees, provide increased flood protection for Delta islands, reduce island subsidence near levees, improve emergency management resources, and develop recommendations for increasing Delta levee seismic stability;
- Water Transfers Program, designed to develop a policy framework for water transfer rules, baseline data collection, public disclosure, and analyses and monitoring of water transfers in the short- and long-term;
- Watershed Program, developing coordination, planning, and program prioritization for watershed management; and
- a range of Storage and Conveyance options for storage and conveyance of water, to provide opportunities for enhanced timing and flow management to better satisfy urban, agricultural, and environmental water users.

1.4 Scope of the MSCS

The scope of the MSCS involves two different considerations: 1) the geographic area encompassed by CALFED actions; and 2) the habitats and species evaluated in the MSCS. The CALFED geographic area is described in Section 1.4.1. The evaluated species and their habitats are defined in Section 1.4.2 and described in Chapter 2 and Chapter 5.

1.4.1 Geographic Scope of the CALFED Program

The CALFED Program affects a very large geographic area and the range of effects varies greatly. For purposes of the MSCS, the following two areas are considered:

- **Focus Area:** This area, shown on Figure 1-1, includes the legally defined Delta, Suisun Bay and Marsh, the Sacramento and San Joaquin rivers and their tributaries down-stream of major dams, and the potential locations of reservoirs. This is the same as the focus study area of the ERP shown on Figure 1-2, with the addition of the reservoir sites. The legally defined Delta is also called the Problem Area and is shown on Figure 1-2.
- **Service Area:** For purposes of the MSCS, all of the areas that receive water from the State Water Project (SWP) or the Central Valley Project (CVP) are in the Service Area, shown on Figure 1-2. Due to the programmatic nature of this document, service area effects could not be explicitly determined at this time. Conservation measures for service area effects will be developed through a two-step process. The first step will be to determine the presence and scope of service area effects. Then, for identified service area effects, CALFED will provide conservation measures through one or more of the following: development of habitat conservation plans for the service areas; addition of conservation measures through the ASIPs; contribution to a Conservation Program; or implementation of measures in the MSCS. For areas with existing HCPs that cover service area effects, no additional conservation measures would be required.

Two additional areas are shown on Figure 1-2, but not analyzed in the MSCS:

- Watershed Program Area: This area encompasses the portions of the watersheds of the San Joaquin and Sacramento rivers located above major dams and outside the focus area. Restoration and management actions implemented in the Watershed Program Area can yield other CALFED Program benefits, such as water quality and water supply improvements and reductions in reservoir sedimentation. However, the MSCS does not include these areas because there is little information available about these actions and many will not be CALFED actions.
- 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 CALFED Program actions do not extend into that area.

1.4.2 Evaluated Species, Covered Species, and Their Habitats

Biologists identified over 400 species that use the 14 Ecological Management Zones in the focus area. This list was reduced to 243 evaluated species that either could be affected by CALFED Program actions or are listed under ESA or CESA. The ERP described goals and developed programmatic actions for many of the evaluated species. The MSCS incorporates ERP programmatic actions as conservation measures and, as necessary for ESA, CESA, and NCCPA compliance, identifies additional mitigation measures. Covered species are those species that would be adequately conserved (State requirement) and for which CALFED Program actions would not cause jeopardy or adversely affect critical habitat (federal requirement). Covered species will be identified in the final MSCS after review of public comments received regarding the draft MSCS. Covered species include species for which take authorization could be issued for actions that meet certain criteria (see Chapter 7) and other species for which take cannot be issued at this time. For example, no take may be authorized for species that are extremely rare or for species with other legal constraints on take beyond the ESA or CESA, such as State fully protected species.

1.5 Conservation Goals and Approach

The MSCS assigns goals for species addressed in the ERP that are consistent with the ERP. For species outside the scope of the ERP, but evaluated in the MSCS, the MSCS also assigns goals. The species goals have been incorporated in the overall CALFED Program. Chapter 3 describes these goals in more detail:

- The goal of “recovery” was assigned to those species whose range is entirely or nearly entirely within the focus area affected by the CALFED Program and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. The term “recover” means the decline of a species is arrested or reversed, threats to the species are neutralized, and thus, the species’ long-term survival in nature is assured.
- The goal “contribute to recovery” was assigned to those 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. The goal “contribute to recovery” implies that CALFED will undertake some of the actions under its control within its problem area and program scope necessary to recover the species.

- The goal “maintain” was assigned to species expected to be minimally affected by CALFED actions. For this category, CALFED will mitigate any adverse effects to the species commensurate with the level of effect on the species; thus, actions may not actually contribute to the recovery of the species, but would be expected, at a minimum, to not contribute to the need to list a species or degrade the status of a listed species. CALFED will also maximize beneficial effects on these species to the extent practicable.

Chapter 3 describes goals for 18 habitat types. The goals for most of the habitats were developed within the ERP and the “Strategic Plan for Ecosystem Restoration” (CALFED 1999). For those habitats that were not a focus of the ERP, the goals were developed using other available scientific information.

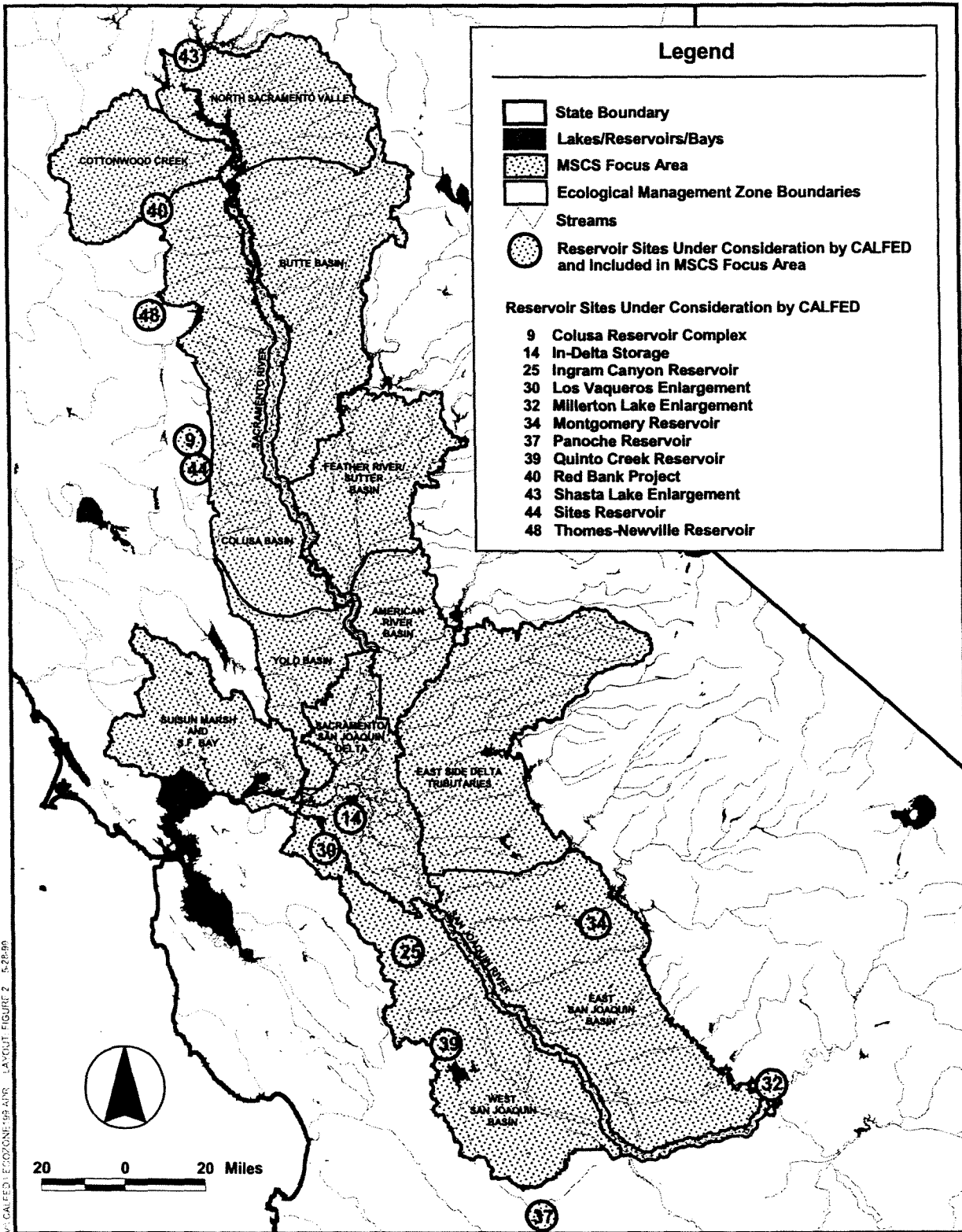
1.6 Relationship of the MSCS to Non-CALFED Projects, Programs, and Plans

The CALFED Program and the MSCS will be implemented in the context of other planning and conservation efforts in the CALFED solution area. Existing efforts include Habitat Conservation Plans (HCPs) approved or under development; other conservation agreements; numerous biological opinions (programmatic and specific) addressing diverse actions within the area; and more than 20 Federal Energy Regulatory Commission (FERC) hydropower relicensing projects. In addition, the Central Valley Project Improvement Act (CVPIA) of 1992 provides for a broad range of habitat enhancement and species protection, much of it within the MSCS focus area. A further effort has been proceeding under SB 1086 to develop a management plan for the Sacramento River system, some of it already funded through CALFED. The CALFED Program must be consistent with all these existing efforts, and will endeavor, through its actions, to enhance their benefits to wildlife. These efforts and their relationship to the CALFED Program are described in Chapter 6.

1.7 Adaptive Management, Monitoring, and Reporting

The scope of the CALFED Program and its MSCS is broad with respect to the number of evaluated species, the variety and area of habitats evaluated, and the nature and duration of the actions to be undertaken. Despite the use of the best available scientific information and a broad array of expert input in its preparation, it is unrealistic to expect that all the measures proposed will be successful, and, even if they are, will be the optimum solutions to the problems addressed. In recognition of the uncertainties inherent in any program of this

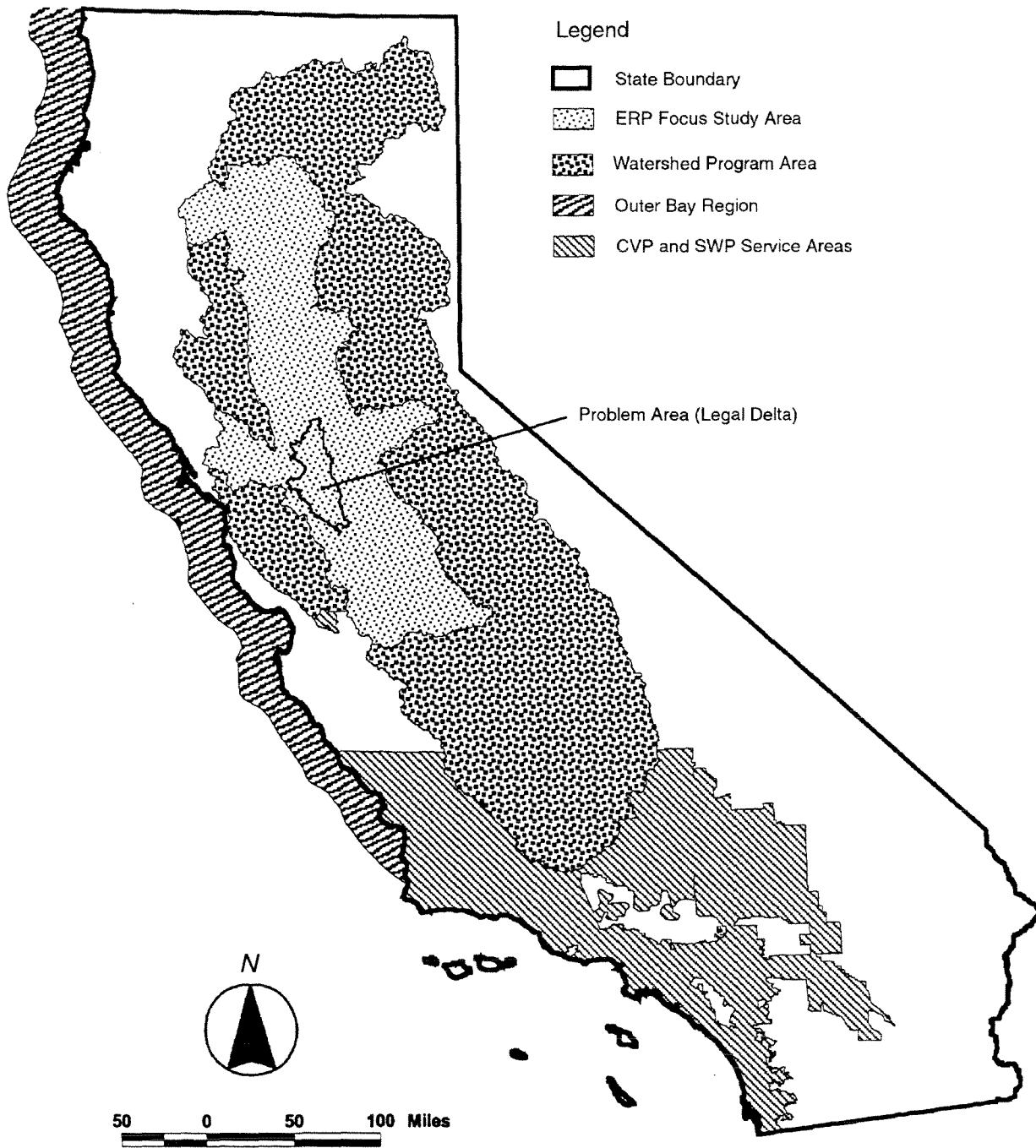
Figure 1-1: Multi-species Conservation Strategy Focus Area



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Figure 1-2: CALFED Program Areas



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scope, the CALFED Program includes provisions for applying adaptive management to ensure that the Program and this strategy will be modified as appropriate to ensure that they consistently use the best information regarding evaluated species and the most effective practical means for achieving their goals. For the CALFED Program as a whole, the Comprehensive Monitoring, Assessment, and Research Program (CMARP) provides for adjusting CALFED's actions in response to a monitoring program. The adaptive management components of the MSCS describe the process for periodically evaluating the effectiveness of the conservation measures and modifying these measures when necessary. Chapter 8 and Chapter 9 describe monitoring and adaptive management, respectively.

1.8 References Cited

CALFED 1999

CALFED. 1999. Strategic Plan for Ecosystem Restoration. Sacramento, California.

2: Natural Communities and Evaluated Species

The ERP and this MSCS address natural communities and the species that depend on them. The MSCS serves as the programmatic NCCP for 20 natural communities, encompassing 18 habitat types and 2 ecologically based fish groups. The 18 habitat types are broad habitat categories, developed using scientifically accepted habitat nomenclature and maintaining consistency with the ERP. The 18 habitat types covered under the MSCS are: tidal perennial aquatic, valley riverine aquatic, montane riverine aquatic, lacustrine, saline emergent, tidal freshwater emergent, nontidal freshwater permanent emergent, natural seasonal wetlands, managed seasonal wetlands, valley/footbill riparian, montane riparian, grassland, inland dune scrub, upland scrub, valley/footbill woodland and forest, montane woodland and forest, upland cropland and seasonally flooded agricultural land.

Fish habitat is not easily identified using terrestrial habitat classifications because fish habitat is dependent on dynamic factors primarily related to water flow. Therefore, two fish groups are evaluated in the MSCS based on the ecological behavior of the included fish species: anadromous fish and estuarine fish. The 18 NCCP habitat types encompass the habitats used by these fish species, except the open ocean.

Special-status species in the context of the MSCS were defined: as any species listed as threatened or endangered, proposed for listing or candidates for listing under the ESA and the CESA; California fully protected species; rare plants listed under the California Native Plant Protection Act; and rare plants listed on California Native Plant Society (CNPS) Lists 1A, 1B, 2 or 3 that may be present in the MSCS focus area shown on Figure 1-1. Over 400 special-status species were identified as known or with the potential to occur within the focus area. From that comprehensive list, a refined subset of 243 species was selected for evaluation in the MSCS, based on their overall status and the potential for the CALFED Program to affect them. Important factors in creating the evaluated species list included whether the species is legally protected from take or could become legally protected during CALFED Program implementation, if CALFED could affect a substantial portion of the species' range or important habitat, and if the species is of specific concern to CALFED. Covered species are evaluated species that will be adequately conserved by implementation of the MSCS and the ERP.

Many species that are not explicitly evaluated in the MSCS will nevertheless benefit from the ERP actions and MSCS measures through the resulting enhancement of their habitats.

2.1 Natural Communities Evaluated in the MSCS

The ERP and this MSCS provide for the conservation of natural communities and the species that depend on them. The MSCS provides the necessary information for a programmatic NCCP for 20 natural communities, encompassing 18 habitat types

and two ecologically based fish groups. When the term “NCCP communities” is used in the MSCS, it refers to both habitats and fish groups. Use of the term “NCCP habitat” or “NCCP habitat type” refers to one of the 18 habitats identified below and excludes the range of additional factors that would account for the needs of evaluated fish species.

2.1.1 NCCP Habitats

The 18 habitat types, called NCCP habitats, are broad habitat categories, each of which include a number of habitat or vegetation types recognized in frequently used classification systems. The following criteria were used to develop the list of 18 habitat types:

- level of acceptance of habitat nomenclature within the scientific community,
- consistency with existing electronically mapped habitat data,
- potential for habitat types to be affected by CALFED Program actions, and
- consistency with existing CALFED habitat nomenclature from the ERP.

The 18 habitat types were selected such that existing GIS habitat data could be used to estimate habitat location and extent and comparisons could be made with ERP habitat targets.

The following sources, describing existing habitat classification systems, were consulted in developing the habitat classification for the MSCS:

- Classification of Wetlands and Deepwater Habitats of the United States (Cowardin *et al.* 1979),
- Classification for California’s Inland Waters (Moyle and Ellison 1991),
- Preliminary Descriptions of Terrestrial Natural Communities of California (Holland 1986),
- The California Wildlife-Habitat Relationship System (Mayer and Laudenslayer 1988),
- A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995),
- Ecosystem Restoration Program Plan (CALFED Bay-Delta Program 1998a), and
- Development of Key Ecological Attributes for the San Francisco Bay-Delta Watershed (CALFED Ecosystem Restoration Indicators Group, n.d.).

A crosswalk for the NCCP habitats and commonly used habitat classifications systems is provided in the MSCS Technical Report entitled, Correlation of NCCP Habitats with Other Classification Systems. A brief description of each of the 18 NCCP habitat types evaluated in the MSCS is provided in the following text.

Tidal perennial aquatic: Tidal perennial aquatic habitat is defined as deepwater aquatic (greater than 3 meters deep from mean low low tide), shallow aquatic (less than or equal to 3 meters deep from mean low low tide), and unvegetated intertidal (i.e., tideflats) zones of estuarine bays, river channels, and sloughs. Tidal perennial aquatic includes all or portions of the ERP tidal perennial aquatic, Delta sloughs, and midchannel island and sloughs habitat types.

2: Natural Communities and Evaluated Species

Valley riverine aquatic: Valley riverine aquatic habitat includes the water column of flowing streams and rivers in low-gradient channel reaches below an elevation of approximately 300 feet that are not tidally influenced, including associated shaded riverine aquatic, pool, riffle, run, and unvegetated channel substrate (including seasonally exposed channel bed) habitat features, and sloughs, backwaters, overflow channels, and flood bypasses hydrologically connected to stream and river channels. Valley riverine aquatic habitat includes portions of the ERP riparian and riverine aquatic habitat.

Montane riverine aquatic: Montane riverine aquatic habitat includes the water column of flowing streams and rivers above an elevation of approximately 300 feet, including associated shaded riverine aquatic, pool, riffle, run, and unvegetated channel substrate (including seasonally exposed channel bed) habitat features, and sloughs, backwaters, and overflow channels hydrologically connected to stream and river channels. Montane riverine aquatic habitat includes portions of the ERP riparian and riverine aquatic habitat.

Lacustrine: Lacustrine habitat is defined as portions of permanent bodies of water that do not support emergent vegetation and that are not subject to tidal exchange, including lakes, ponds, oxbows, gravel pits, and flooded islands. Lacustrine habitat includes portions of the ERP nontidal perennial aquatic habitat.

Saline emergent: Saline emergent habitat includes the portions of San Francisco, San Pablo, and Suisun bays and the Delta that support emergent wetland plant species that are tolerant of saline or brackish conditions within the intertidal zone or on lands that historically were subject to tidal exchange (i.e., diked wetlands). Saline emergent habitat includes most of the ERP saline emergent wetland habitat.

Tidal freshwater emergent: Tidal freshwater emergent habitat includes portions of the intertidal zones of the Delta that support emergent wetland plant species that are not tolerant of saline or brackish conditions. Tidal freshwater emergent habitat includes portions of the ERP Delta sloughs, midchannel islands and sloughs, and fresh emergent wetland habitats.

Nontidal freshwater permanent emergent: Nontidal freshwater permanent emergent includes permanent (natural and managed) wetlands, including meadows, dominated by wetland plant species that are not tolerant of saline or brackish conditions. Nontidal freshwater permanent emergent habitat includes portions of the ERP fresh emergent wetlands habitat.

Natural seasonal wetland: Natural seasonal wetland habitat includes vernal pools and other nonmanaged seasonal wetlands with natural hydrologic conditions that are dominated by herbaceous vegetation and annually pond surface water or maintain saturated soils at the ground surface for a portion of the year of sufficient duration to support facultative or obligate wetland plant species. Alkaline and saline seasonal wetlands that were not historically part of a tidal regime are

included in natural seasonal wetlands. Natural seasonal wetland habitat includes portions of the ERP seasonal wetlands habitat.

Managed seasonal wetland: Managed seasonal wetland habitat includes wetlands dominated by native or non-native herbaceous plants, excluding croplands farmed for profit (e.g., corn and rice), that are flooded and drained by land managers during specific periods to enhance habitat values for specific wildlife species. Ditches and drains associated with managed seasonal wetlands are included in this habitat type. Managed seasonal wetland habitat includes portions of the ERP seasonal wetlands habitat.

Valley/foothill riparian: Valley/foothill riparian habitat includes all successional stages of woody vegetation generally dominated by willow, Fremont cottonwood, valley oak, or sycamore within the active and historical floodplains of low-gradient reaches of streams and rivers generally below an elevation of 300 feet. Valley/foothill riparian habitat includes portions of the ERP riparian and riverine aquatic habitat.

Montane riparian: Montane riparian habitat includes all successional stages of woody vegetation, such as willow, black cottonwood, white alder, birch, and dogwood, within the active floodplains of moderate to high gradient reaches of streams and rivers generally above an elevation of 300 feet. Montane riparian habitat includes portions of the ERP riparian and riverine aquatic habitat.

Grassland: Grassland habitat is defined to include upland vegetation communities dominated by introduced and native annual and perennial grasses and forbs, including nonirrigated and irrigated pasturelands. Grassland habitat includes all of the ERP perennial grassland habitat and the much more extensive annual grassland vegetation that is not addressed in the ERP.

Inland dune scrub: Inland dune scrub habitat comprises vegetated stabilized sand dunes associated with river and estuarine systems. Inland dune scrub includes all of the ERP inland dune scrub habitat.

Upland scrub: Upland scrub habitat includes habitat areas that are dominated by shrubs characteristic of coastal scrub, chaparral, and saltbush scrub communities. Upland scrub is not included in the ERP.

Valley/foothill woodland and forest: Valley/foothill woodland and forest habitat includes non-riparian forest, woodland, and savanna of valleys and foothills. These vegetation communities are commonly dominated by valley oak, blue oak, interior live oak, coast live oak, and foothill pine. Valley/foothill woodland and forest habitat is not included in the ERP.

Montane woodland and forest: Montane woodland and forest habitat includes nonriparian forest and woodland above the foothills. These vegetation communities are commonly dominated by pine, fir, cedar, and black oak. Montane woodland and forest habitat is not included in the ERP.

2: Natural Communities and Evaluated Species

Upland cropland: Upland cropland habitat includes agricultural lands farmed for grain and for field, truck, and other crops that are not seasonally flooded. Upland cropland is included in the ERP as agricultural lands.

Seasonally flooded agricultural land: Seasonally flooded agricultural land habitat includes agricultural lands farmed for grain and rice and for field, truck, and other crops that require seasonal flooding for durations of a least 1 week as a management practice (e.g., pest control and irrigation) or are purposefully flooded seasonally to enhance habitat values for specific wildlife species (e.g., ducks for duck clubs). Agricultural ditches and drains associated with maintaining seasonally flooded agricultural land are included in this habitat type. Seasonally flooded agricultural land is included in the ERP as agricultural lands.

2.1.2 NCCP Fish Groups

Two fish groups, anadromous fish species and estuarine fish species, are evaluated in the MSCS. Table 2-1 identifies the species included in each group and the NCCP habitat types with which they are associated. Non-estuarine NCCP aquatic habitats used by some estuarine fish species during some periods are included in the evaluation. These fish groups are addressed separately from NCCP habitat types because they cannot be adequately addressed through evaluation of NCCP habitats, which are based on vegetation, land use, and geography. Evaluation of NCCP fish groups addresses potential CALFED Program effects on the dynamic factors that support fish populations, such as water flow, depth, temperature, quality, and seasonal fluctuations in stage and flow as well as potential CALFED Program effects on the NCCP habitats with which they are associated. The fish groups:

- address evaluated species that would be most affected by CALFED water storage, conveyance, and water operations actions;
- address evaluated species whose populations are dependent on the Bay-Delta ecosystem; and
- address species for which recovery goals have been established.

2.2 Species Evaluated by the MSCS

Pursuant to Section 7(c) of the ESA, CALFED requested that USFWS provide information regarding any species listed or proposed for listing as threatened or endangered under the ESA that may be present in the MSCS focus area. The MSCS focus area includes the area within the ERP focus study area and the 12 potential reservoir sites. Additionally, CALFED and USFWS developed a list of special-status species known to occur or with the potential to occur within the focus area. Species affected only indirectly by the CALFED Program within the service areas were not included in this evaluation and will require additional analysis (see Chapter 5).

Table 2-1: Fish Group Species and Associated NCCP Habitats

Fish Group	Included Species	NCCP Habitat Types
Anadromous fish species	Winter-run chinook salmon, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead Evolutionarily Significant Unit (ESU), Central Coast steelhead ESU, and green sturgeon	Tidal perennial aquatic, valley riverine aquatic, montane riverine aquatic, lacustrine, saline emergent, and tidal freshwater emergent
Estuarine fish species	Tidewater goby, delta smelt, longfin smelt, Sacramento splittail, and Sacramento perch	Tidal perennial aquatic, valley riverine aquatic, lacustrine, saline emergent, and tidal freshwater emergent

Special-status species include those that are in at least one of the following categories:

- federally listed as threatened or endangered under the ESA;
- proposed for federal listing under the ESA;
- federal candidates under the ESA;
- California-listed as threatened or endangered under the CESA;
- California candidates under the CESA;
- plants listed as rare under the California Native Plant Protection Act;
- California fully protected species or specified birds under various sections of the California Fish and Game Code;
- California species of special concern (CSC);
- CNPS List 1A, 1B, 2, or 3; or
- other native species of concern to CALFED.

Over 400 special-status fish, wildlife, and plant species were identified as known or with the potential to occur within the ERP focus study area and potential reservoir sites. This preliminary species list was generated from electronic databases of known occurrences of special-status species (CDFG's Natural Diversity Data Base and CNPS' Inventory of Rare and Endangered Plants), followed by a review by wildlife biologists and botanists for potentially occurring species based on known range and habitat requirements. CALFED worked with teams of biologists with specific expertise about species in the focus area to refine the list of species to 243 species for evaluation in the MSCS. Species evaluated in the MSCS meet at least one of the following criteria:

- the species is federally listed as threatened or endangered or California-listed as rare, threatened, endangered, or fully protected;

2: Natural Communities and Evaluated Species

- the species could become federally or California-listed as threatened or endangered during the term of CALFED implementation (at least 30 years) and the species could be adversely affected by CALFED actions; or
- CALFED actions could affect a substantial portion of the species' range or important habitat and these species are of specific concern to CALFED.

The first criterion is simple to apply; listed species are included for evaluation. Under the second criterion, species considered to have the potential to become federally or state-listed during the term of CALFED implementation are those that are: proposed for federal listing, federal candidates, or California candidates. Additionally, California species of special concern, specified birds, CNPS List 1 and List 2 species, and other species of concern were considered to have the potential to become listed during the term of CALFED if CALFED actions could affect a substantial portion of the species' range or important habitat, or if the species is especially rare or its distribution is limited. Under the third criterion, important habitat identified included breeding and roosting habitat for various species evaluated in the MSCS. Species from the focus area that are evaluated in the MSCS are provided in Table 2-2. Ecological and status information on evaluated species are provided in the MSCS Technical Report entitled, Species Accounts for MSCS Evaluated Species.

Species that did not meet the criteria for being evaluated in the MSCS are identified in Attachment 1: Species Considered for Inclusion in the MSCS but Not Evaluated. Although these species are not explicitly evaluated, many of these species will benefit from the ERP actions and MSCS conservation measures through benefits to their habitats.

2.3 Covered Species

Covered species, selected from the list of evaluated species, are those species that would be adequately conserved (State requirement) and for which CALFED Program actions would not cause jeopardy or adversely affect critical habitat (federal requirement). Covered species will be identified in the final MSCS after review of public comments received regarding the draft MSCS. Only species currently identified as evaluated species will be included in the list of covered species. Evaluated species that the wildlife agencies determine are not adequately conserved and protected from jeopardy by the MSCS and ERP will not be included as covered species. Evaluated species whose habitat will not be significantly increased or enhanced under the MSCS and ERP are most likely to be excluded. However, the Wildlife Agencies expect that most, if not all, of the 243 evaluated species will meet the requirements for covered species.

2.4 References Cited

CALFED 1998a

CALFED. 1998a. Ecosystem Restoration Program Plan, contained in the March 1998 Draft PEIS/EIR. Sacramento, California.

CALFED Ecosystem Restoration Indicators Group, n.d.

CALFED Ecosystem Restoration Indicators Group. n.d. Development of key ecological attributes for the San Francisco Bay-Delta Watershed. Unpublished information provided to Multi-species Conservation Strategy Staff Team. Sacramento, California.

Cowardin et al. 1979

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. U. S. Fish and Wildlife Service Pub. FWS/OBS-79/31. Washington, D.C.

Holland 1986

Holland, R.F. 1986. *Preliminary descriptions of the terrestrial natural communities of California*. California Department of Fish and Game. Sacramento, California. 156 pp.

Mayer and Laudenslayer 1988

Mayer and Laudenslayer. 1988. *A guide to wildlife habitats of California*. California Department of Forestry and Fire Protection, Sacramento, California.

Moyle and Ellison 1991

Moyle, P. B. and J. P. Ellison. 1991. *A conservation-oriented classification system for the inland waters of California*. California Department of Fish and Game. 77: 161-180. Sacramento, California.

Sawyer and Keeler-Wolf 1995

Sawyer, J. O. and Todd Keeler-Wolf. 1995. *A manual of California vegetation*. California Native Plant Society. Sacramento, California. 471 pp.

Table 2-2: Species Evaluated in the MSCS

MSCS User Guide: This table presents the species evaluated in the MSCS and describes the criteria used to select the evaluated species. The table also identifies the MSCS goal established for each species and a determination of the likelihood that a species may be affected by the Program. Species goals are discussed in Chapter 3 and the determination of the potential for Program effects on species is discussed in Chapter 5.

Criteria for Developing the Preliminary Species List

The preliminary species list included special-status species known to occur or with potential to occur in the MSCS focus area (i.e., the ERP's 14 Ecological Management Zones and 14 potential reservoir sites). The preliminary list was developed using the criteria described below:

Special-status species are species having some form of endangerment or concern status. Special-status species are species that are:

- federally listed as threatened or endangered under the Endangered Species Act (ESA);
- California-listed as threatened or endangered under the California Endangered Species Act (CESA);
- California-listed as rare under the California Native Plant Protection Act;
- proposed for federal listing under the ESA;
- California candidates under the CESA;
- federal candidates under the ESA;
- California fully protected species or specified birds;
- California species of special concern (CSC);
- California Native Plant Society (CNPS) List 1A, List 1B, List 2, or List 3; or
- other species of concern to CALFED.

The determination that a species has the potential to occur in the MSCS focus area was based on the species' known range and the presence of suitable habitat within the MSCS focus area.

Species Evaluated in the MSCS

The preliminary species list was reduced to the list of species to be evaluated in the MSCS by application of the following criteria:

- the species is federally or California-listed as rare, threatened, or endangered; or California fully protected species, or
- the species could become federally or California-listed as threatened or endangered during the term of CALFED implementation and the species could be affected by CALFED actions, or
- CALFED actions could affect a substantial portion of the species' range or important habitat and these species are of specific concern to CALFED.

Species considered to have the potential to become federally or California-listed as threatened or endangered during the term of CALFED implementation are those that are:

- proposed for Federal listing, or
- California candidates, or
- federal candidates, or
- CSC (each species considered individually for inclusion - see Decision Criteria), or
- specified birds (each species considered individually for inclusion - see Decision Criteria), or
- CNPS List 1, 2, and 3 (each species considered individually for inclusion - see Decision Criteria), or
- other species of concern (each species considered individually for inclusion - see Decision Criteria).

CSC, specified birds, CNPS Lists 1-3, and other species of concern are included if CALFED actions could affect a substantial portion of the species' range or important habitat or if the species is rare or its distribution is limited.

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Species Type ²	Common Name	Scientific Name	Status ³			Other	May Be Affected	Not Likely to be Affected	Decision Criteria, ⁴
			Federal	State	Potential Effects of CALFED Action ⁴				
M	San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	E	CT	-	X		L	
M	Giant kangaroo rat	<i>Dipodomys ingens</i>	E	CE	-	X		L	
M	Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	E	CE/FP	-	X		L	
B	Least Bell's vireo	<i>Vireo bellii pusillus</i>	E	CE	-	X		L	
B	Northern spotted owl	<i>Strix occidentalis caurina</i>	T	-	-		X2	L	
B	Northern spotted owl critical habitat	<i>Strix occidentalis caurina</i> critical habitat							
B	California least tern	<i>Sterna anillarum brouni</i>	E	CT/FP	-	X		L	
B	Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	T	GSC	-	X		L	
B	California clapper rail	<i>Rallus longirostris obsoletus</i>	E	CE/FP	-	X		L	
B	American peregrine falcon	<i>Falco peregrinus anatum</i>	E	CE/FP	-	X		L	
B	American peregrine falcon critical habitat	<i>Falco peregrinus anatum</i> critical habitat							
B	Bald eagle	<i>Haliaeetus leucocephalus</i>	T/PR	CE/FP	-	X		L	
B	California condor	<i>Gymnogyps californianus</i>	E	CE/FP	-		X1	L	
B	Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	T	-	-	X		L	
B	California brown pelican	<i>Pelecanus occidentalis californicus</i>	E	CE/FP	-		X1	L	
R	Alameda whipsnake	<i>Masticophis lateralis euryxanthus</i>	T	CT	-	X		L	
R	Giant garter snake	<i>Thamnophis gigas</i>	T	CT	-	X		L	
R	Blunt-nosed leopard lizard	<i>Gambelia sila</i>	E	CE/FP	-	X		L	
A	California red-legged frog	<i>Rana aurora draytonii</i>	T	GSC	-	X		L	
F	Delta smelt	<i>Hypomesus transpacificus</i>	T	CT	-	X		L	
F	Delta smelt critical habitat	<i>Hypomesus transpacificus</i> critical habitat							
F	Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	T	GSC	-	X		L	
F	Central Coast Steelhead ESU	<i>Oncorhynchus mykiss</i>	T	-	-	X		L	
F	Central Valley Steelhead ESU	<i>Oncorhynchus mykiss</i> (cv)	T	-	-	X		L	
F	Winter-run chinook salmon	<i>Oncorhynchus tshawytscha</i> (wr)	E	CE	-	X		L	
F	Winter-run chinook salmon critical habitat	<i>Oncorhynchus tshawytscha</i> critical habitat							
F	Tidewater goby	<i>Eucyclogobius newberryi</i>	E	GSC	-		X2	L	
I	Callippe silverspot	<i>Speyeria callippe callippe</i>	E	-	-		X2	L	
I	Lange's metalmark	<i>Apodemia mormo langei</i>	E	-	-	X		L	

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Type	Species	Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		
					Federal	State	Other	May Be Affected	Not Likely to be Affected	Decision Criteria,
I	R		Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	T	-	-	X		L
I	I		Valley elderberry longhorn beetle critical habitat	<i>Desmocerus californicus dimorphus</i> critical habitat						
I	r		Delta green ground beetle	<i>Elaphrus viridis</i>	T	-	-	X		L
I	I		Delta green ground beetle critical habitat	<i>Elaphrus viridis</i> critical habitat						
I	m		California freshwater shrimp	<i>Syncaris pacifica</i>	E	CE	-	X		L
I	m		Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	E	-	-	X		L
I	m		Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>	E	-	-	X	X2	L
I	m		Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	T	-	-	X		L
I	m		Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	E	-	-	X		L
P	R		Antioch Dunes evening-primrose	<i>Oenothera deltooides ssp. howellii</i>	E	CE	IB	X		L
P			Antioch Dunes evening-primrose critical habitat	<i>Oenothera deltooides ssp. howellii</i> critical habitat						
P	m		Butte County meadowfoam	<i>Limnanthes floccosa ssp. californica</i>	E	CE	IB		X2	L
P	m		California scabite	<i>Suaeda californica</i>	E	-	IB	X		L
P	m		California vervain	<i>Verbena californica</i>	T	CT	IB		X2	L
P	m		Calistoga popcornflower	<i>Plagiobothrys strictus</i>	E	CT	IB		X2	L
P	m		Chinese Camp brodiaea	<i>Brodiaea pallida</i>	T	CE	IB	X		L
P	m		Clara Hunt's milkvetch	<i>Astragalus clarianus</i>	E	CT	IB		X2	L
P	m		Colusa grass	<i>Neostapfia colusana</i>	T	CE	IB	X		L
P	m		Contra Costa goldfields	<i>Lasthenia conjugens</i>	F	-	IB	X		L
P	R		Contra Costa wallflower	<i>Erysimum capitatum ssp. angustatum</i>	E	CE	IB	X		L
P			Contra Costa wallflower critical habitat	<i>Erysimum capitatum ssp. angustatum</i> critical habitat						
P	r		Grampton's tuctoria	<i>Tuctoria mucronata</i>	E	CE	IB	X		L
P	m		El Dorado bedstraw	<i>Galium californicum ssp. sierrae</i>	E	R	IB		X2	L
P	m		Few-flowered navarretia	<i>Navarretia leucocephala ssp. pauciflora</i>	E	CT	IB		X2	L
P	m		Greene's tuctoria	<i>Tuctoria greenii</i>	E	R	IB	X		L
P	m		Hairy orcutt grass	<i>Orcuttia pilosa</i>	E	CE	IB	X		L
P	m		Hartweg's golden sunburst	<i>Pseudobahia bahifolia</i>	E	CE	IB	X		L

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Type ¹	Species Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		Decision Criteria ⁵
				Federal	State	Other	May Be Affected	Not Likely to be Affected	
Federally Listed as Endangered or Threatened (continued)									
P	m	Hoover's eriastrum	<i>Eriastrum hooveri</i>	T	-	-	X		L
P	m	Hoover's spurge	<i>Chamaesyce hooveri</i>	T	-	1B	X		L
P	m	Ione buckwheat	<i>Eriogonum apricum</i> var. <i>apricum</i>	E	CE	1B		X2	L
P	m	Ione manzanita	<i>Arctostaphylos myrsifolia</i>	T	-	1B		X2	L
P	m	Kenwood Marsh checkerbloom	<i>Sidalcea oregana</i> ssp. <i>valida</i>	E	CE	1B	X		L
P	m	Large-flowered fiddleneck	<i>Amsinckia grandiflora</i>	E	CE	1B	X		L
P		Large-flowered fiddleneck critical habitat	<i>Amsinckia grandiflora</i> critical habitat						
P	m	Layne's ragwort	<i>Senecio layneae</i>	T	R	1B	X		L
P	m	Loch Lomond button-celery	<i>Eryngium constancei</i>	E	CE	1B		X2	L
P	m	Many-flowered navarretia	<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>	E	CT	1B		X2	L
P	m	Marin western flax	<i>Hesperolimon congestum</i>	T	CT	1B		X2	L
P	m	Napa blue grass	<i>Poa napensis</i>	E	CE	1B		X2	L
P	m	Pallid manzanita	<i>Arctostaphylos pallida</i>	T	CE	1B		X2	L
P	m	Palmate-bracted bird's-beak	<i>Cordylanthus palmatus</i>	E	CE	1B	X		L
P	m	Pine Hill ceanothus	<i>Ceanothus roderickii</i>	E	R	1B		X2	L
P	m	Pine Hill flannelbush	<i>Fremontodendron decumbens</i>	E	R	1B		X2	L
P	m	Pitkin Marsh lily	<i>Lilium pardalinum</i> ssp. <i>pitkinense</i>	E	CE	1B	X		L
P	m	Sacramento orcutt grass	<i>Orcuttia viscida</i>	E	CE	1B	X		L
P	m	San Benito evening-primrose	<i>Camissonia benitensis</i>	T	-	1B		X2	L
P	m	San Joaquin adobe sunburst	<i>Pseudobabia peirsonii</i>	T	CE	1B		X2	L
P	m	San Joaquin Valley orcutt grass	<i>Orcuttia inaequalis</i>	T	CE	1B	X		L
P	m	San Joaquin woollythreads	<i>Lembertia congdonii</i>	E	-	1B	X		L
P	m	Sebastopol meadowfoam	<i>Limnanthes vinculans</i>	E	CE	1B		X2	L
P	m	Showy Indian clover	<i>Trifolium amoenum</i>	E	-	1B	X		L
P	m	Slender orcutt grass	<i>Orcuttia tenuis</i>	T	CE	1B	X		L
P	R	Soft bird's-beak	<i>Cordylanthus mollis</i> ssp. <i>mollis</i>	E	R	1B	X		L
P	m	Sonoma alopecurus	<i>Alopecurus aequalis</i> var. <i>sonomensis</i>	E	-	1B	X		L
P	m	Sonoma spineflower	<i>Chorizanthe valida</i>	E	CE	1B		X2	L
P	m	Sonoma sunshine	<i>Blennosperma bakeri</i>	E	CE	1B		X2	L
P	m	Stebbins' morning-glory	<i>Calystegia stebbinsii</i>	E	CE	1B		X2	L
P	m	Succulent owl's-clover	<i>Castilleja campestris</i> ssp. <i>succulenta</i>	T	CE	1B	X		L

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Type Species Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		
			Federal	State	Other	May Be Affected	Not Likely to be Affected	Decision Criteria ⁵
P	R	Suisun thistle	E	-	IB	X		L
P	m	Tiburon Indian paintbrush	E	CT	IB		X2	L
P	m	Tiburon jewelflower	E	CE	IB		X2	L
P	m	Tiburon Mariposa lily	T	CT	IB		X2	L
P	m	White sedge	E	CE	IB	X		L
P	m	White-rayed pentachaeta	E	CE	IB		X2	L
California Listed as Endangered, Threatened, Rare, or Fully Protected								
M	m	Ringtail	-	FP	-	X		L
M	m	Nelson's antelope ground squirrel	-	CT	SC	X		L
M	r	Riparian brush rabbit	PE	CE	-	X		L
M	m	California wolverine	-	CT/FP	SC		X2	L
B	r	Little willow flycatcher	-	CE	SC	X		L
B	r	Bank swallow	-	CT	-	X		L
B	r	Western yellow-billed cuckoo	-	CE	-	X		L
B	r	Greater sandhill crane	-	CT/FP	-	X		L
B	r	California black rail	-	CT/FP	SC	X		L
B	m	White-tailed kite	-	FP	-	X		L
B	m	Golden eagle	PR	CSC/FP	-		X1	L
B	r	Swainson's hawk	-	CT	-	X		L
A	m	Limestone salamander	-	CT/FP	SC		X2	L
A	m	Shasta salamander	-	CT	SC	X		L
F	R	Central Valley spring-run chinook salmon	PE	CT	-	X		L
F	m	Rough sculpin	-	CT/FP	SC	X		L
P	m	Baker's larkspur	PE	R	IB		X2	L
P	m	Baker's manzanita	-	R	IB/SC		X2	L
P	m	Boggs Lake hedge-hyssop	-	CE	IB	X		L
P	r	Delta coyote-thistle	-	CE	IB/SC	X		L
P	m	Indian Valley brodiaea	-	CE	IB		X2	L
P	m	Irish Hill buckwheat	PE	CE	IB		X2	L
(continued)								

Table 2-2: Species Evaluated in the MSCS (continued)

Type ¹	Species Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		Decision Criteria ⁵
				Federal	State	Other	May Be Affected	Not Likely to be Affected	
California Listed as Endangered, Threatened, Rare, or Fully Protected (continued)									
P	m	Marin checkerbloom	<i>Sidalcea hickmanii ssp. viridis</i>	-	R	1B/SC		X2	L
P	m	Mason's ceanothus	<i>Ceanothus masonii</i>	-	R	1B/SC		X2	L
P	R	Mason's lilaeopsis	<i>Lilaeopsis masonii</i>	-	R	1B/SC	X		L
P	m	Mt. Diablo bird's-beak	<i>Cordylanthus nidularius</i>	-	R	1B/SC		X2	L
P	m	North Coast semaphore grass	<i>Pleuropogon hooverianus</i>	-	R	1B/SC		X2	L
P	m	Rock sanicle	<i>Sanicula saxatilis</i>	-	R	1B/SC	X		L
P	m	Santa Cruz tarplant	<i>Holocarpus macradenia</i>	PT	CE	1B		X2	L
P	m	Tree-anemone	<i>Carpenteria californica</i>	-	CT	1B/SC	X		L
P	m	Yellow larkspur	<i>Delphinium luteum</i>	PE	R	1B		X2	L
Federally Proposed									
M	r	San Joaquin Valley woodrat	<i>Neotoma fuscipes riparia</i>	PE	CSC	-	X		P
B	m	Mountain plover	<i>Charadrius montanus</i>	PT	CSC	-	X		P
F	R	Central Valley fall-run chinook salmon	<i>Oncorhynchus tshawytscha (fr)</i>	PT	CSC	-	X		P
Federal Candidate									
A	m	California tiger salamander	<i>Ambystoma californiense</i>	C	CSC	-	X		P
F	m	McCloud River redband trout	<i>Oncorhynchus mykiss ssp 2</i>	C	CSC	-	X		P
California Species of Special Concern or CNPS List 1 or 2									
M	m	Greater western mastiff-bat	<i>Eumops perotis californicus</i>	-	CSC	SC	X		A
M	R	Suisun ornate shrew	<i>Sorex ornatus sinuosus</i>	-	CSC	SC	X		B
M	r	San Pablo California vole	<i>Microtus californicus sanpabloensis</i>	-	CSC	-	X		A
B	r	California yellow warbler	<i>Dendroica petechia breusteri</i>	-	CSC	-	X		A
B	r	Saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>	-	CSC	SC	X		A
B	R	San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	-	CSC	SC	X		A
B	R	Suisun song sparrow	<i>Melospiza melodia maxillaris</i>	-	CSC	SC	X		A
B	m	Tricolored blackbird	<i>Agelaius tricolor</i>	-	CSC	SC	X		A
B	m	Yellow-breasted chat	<i>Icteria virens</i>	-	CSC	-	X		A
B	m	Long-eared owl	<i>Asio otus</i>	-	CSC	-	X		B
(continued)									

Table 2-2: Species Evaluated in the MSCS (continued)

Type ¹	Species ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		
				Federal	State	Other	May Be Affected	Not Likely to be Affected	Decision
B	m	Short-eared owl	<i>Asio flammeus</i>	-	CSC	-	X		B
B	m	Western burrowing owl	<i>Athene cunicularia hypuga</i>	-	CSC	SC	X		A
B	m	California gull	<i>Larus californicus</i>	-	CSC	-	X		B
B	m	Black tern	<i>Chlidonias niger</i>	-	CSC	SC	X		B
B	m	Long-billed curlew	<i>Numenius americanus</i>	-	CSC	-	X		A
B	m	Cooper's hawk	<i>Accipiter cooperii</i>	-	CSC	-	X		A
B	m	Northern harrier	<i>Circus cyaneus</i>	-	CSC	-	X		A
B	m	Osprey	<i>Pandion haliaetus</i>	-	CSC/SB	-	X		A
B	m	White-faced ibis	<i>Plegadis chihi</i>	-	CSC	SC	X		A
B	m	Western least bittern	<i>Ixobrychus exilis</i>	-	CSC	SC	X		A
B	m	Double-crested cormorant (rookery)	<i>Phalacrocorax auritus</i>	-	CSC	-	X		A
R	m	San Joaquin whipsnake	<i>Masticophis flagellum ruddocki</i>	-	CSC	SC	X		B
R	m	Western pond turtle	<i> Clemmys marmorata</i>	-	CSC	SC	X		A
A	m	Foothill yellow-legged frog	<i>Rana boylei</i>	-	CSC	SC	X		A
A	m	Western spadefoot	<i>Scaphiopus hammondi</i>	-	CSC	SC	X		A
F	m	Hardhead	<i>Mylopharodon conocephalus</i>	-	CSC	-	X		B
F	r	Sacramento perch	<i>Archoplites interruptus</i>	-	CSC	SC	X		B
F	R	Longfin smelt	<i>Spirinchus thaleichthys</i>	-	CSC	-	X		B
F	R	Green sturgeon	<i>Acipenser medirostris</i>	-	CSC	-	X		B
I	m	Monarch butterfly (roost)	<i>Danaus plexippus</i>	-	CSC	-	X		B
P	m	Adobe-lily	<i>Fritillaria pluriflora</i>	-	-	IB/SC	X		B
P	m	Ahart's dwarf rush	<i>Juncus leptospermus</i> var. <i>ahartii</i>	-	-	IB/SC	X		B
P	m	Ahart's paronychia	<i>Paronychia abartii</i>	-	-	IB/SC	X		B
P	r	Alkali milkvetch	<i>Astragalus tener</i> var. <i>tener</i>	-	-	IB/SC	X		A
P	m	Arbuta Ranch jewelflower	<i>Streptanthus insignis</i> ssp. <i>lyonii</i>	-	-	IB/SC	X		B
P	m	Beaked clarkia	<i>Clarkia rostrata</i>	-	-	IB/SC	X		B
P	m	Bellingher's meadowfoam	<i>Limnanthes flocosa</i> ssp. <i>bellingheriana</i>	-	-	IB/SC	X		B
P	m	Ben Lomond buckwheat	<i>Eriogonum nudum</i> var. <i>decurrens</i>	-	-	IB	X		B
P	m	Big Bear Valley woollypod	<i>Astragalus leucobolus</i>	-	-	IB/SC	X		B

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Type ¹	Species Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		
				Federal	State	Other	May Be Affected	Not Likely to be Affected	Decision Criteria ⁵
California Species of Special Concern or CNPS List 1 or 2 (continued)									
P	m	Big tarplant	<i>Blepharizonia plumosa ssp. plumosa</i>	-	-	1B	X		B
P	m	Brandegee's eriastrum	<i>Eriastrum brandegeae</i>	-	-	1B/SC	X		B
P	m	Brewer's western flax	<i>Hesperolinon breweri</i>	-	-	1B/SC	X		B
P	r	Bristly sedge	<i>Carex comosa</i>	-	-	2	X		B
P	m	Brittlescale	<i>Atriplex depressa</i>	-	-	1B/SC	X		A
P	m	California beaked-rush	<i>Rhynchospora californica</i>	-	-	1B/SC	X		A
P	m	Carquinez goldenbush	<i>Isocoma arguta</i>	-	-	2B/SC	X		A
P	m	Congdon's lomatium	<i>Lomatium congdonii</i>	-	-	1B/SC	X		B
P	m	Congdon's tarplant	<i>Hemizonia parryi ssp. congdonii</i>	-	-	1B/SC	X		A
P	m	Contra Costa manzanita	<i>Arctostaphylos manzanita ssp. laevigata</i>	-	-	1B	X		B
P	r	Delta mudwort	<i>Limosella subulata</i>	-	-	2	X		A
P	r	Delta tule pea	<i>Lathyrus jepsonii var. jepsonii</i>	-	-	1B/SC	X		A
P	m	Diablo helianthella	<i>Helianthella castanea</i>	-	-	1B/SC	X		B
P	m	Diamond-petaled California poppy	<i>Eschscholzia rhombipetala</i>	-	-	1B/SC	X		B
P	m	Dimorphic snapdragon	<i>Antirrhinum subcordatum</i>	-	-	1B	X		B
P	m	Drymaria-like western flax	<i>Hesperolinon drymarioides</i>	-	-	1B/SC	X		B
P	m	Dwarf soaproot	<i>Chlorogalum pomeridianum var. minus</i>	-	-	1B	X		B
P	m	Eel-grass pondweed	<i>Potamogeton zosteriformis</i>	-	-	2	X		A
P	m	English Peak greenbriar	<i>Smilax jamesii</i>	-	-	1B	X		A
P	m	Ferris' milkvetch	<i>Astragalus tener var. ferrisiae</i>	-	-	1B/SC	X		A
P	m	Four-angled spikerush	<i>Eleocharis quadrangulata</i>	-	-	2	X		A
P	m	Hall's bush mallow	<i>Malacothammus hallii</i>	-	-	1B	X		B
P	m	Hall's tarplant	<i>Hemizonia halliana</i>	-	-	1B	X		B
P	m	Heartscale	<i>Atriplex cordulata</i>	-	-	1B/SC	X		A
P	m	Heckard's peppergrass	<i>Lepidium latipes var. heckardii</i>	-	-	1B	X		B
P	m	Hispid bird's-beak	<i>Cordylanthus mollis ssp. hispidus</i>	-	-	1B/SC	X		A
P	m	Hospital Canyon larkspur	<i>Delphinium californicum ssp. interius</i>	-	-	1B/SC	X		B
P	m	Jepson's milkvetch	<i>Astragalus rattanii var. jepsonianus</i>	-	-	1B	X		B
P	m	Klamath manzanita	<i>Arctostaphylos klamathensis</i>	-	-	1B/SC	X		B

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Type	Species	Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		
					Federal	State	Other	May Be Affected	Not Likely to be Affected	Decision Criteria ⁵
P	m		Legenere	<i>Legenere limosa</i>	-	-	1B/SC	X		B
P	m		Lesser saliscale	<i>Atriplex minuscula</i>	-	-	1B/SC	X		A
P	m		Lost Hills crownscale	<i>Atriplex vallicola</i>	-	-	1B/SC	X		A
P	m		Mad-dog skullcap	<i>Scutellaria lateriflora</i>	-	-	2	X		A
P	m		Madera linanthus	<i>Linanthus serrulatus</i>	-	-	1B	X		B
P	m		Mariposa clarkia	<i>Clarkia biloba ssp. australis</i>	-	-	1B	X		B
P	m		Marsh checkerbloom	<i>Sidalcea oregana ssp. hydrophila</i>	-	-	1B/SC	X		A
P	m		Marsh skullcap	<i>Scutellaria galericulata</i>	-	-	2	X		B
P	m		Merced phacelia	<i>Phacelia ciliata var. opaca</i>	-	-	1B/SC	X		B
P	m		Most beautiful jewel-flower	<i>Streptanibus albidus ssp. paramoensis</i>	-	-	1B	X		B
P	m		Mt. Diablo fairy lantern	<i>Catolobortus pulchellus</i>	-	-	1B	X		B
P	m		Mt. Diablo jewelflower	<i>Streptanibus hispidus</i>	-	-	1B/SC	X		B
P	m		Mt. Diablo manzanita	<i>Arctostaphylos auriculata</i>	-	-	1B	X		B
P	m		Mt. Diablo phacelia	<i>Phacelia phacelioides</i>	-	-	1B/SC	X		B
P	m		Mt. Hamilton coropsis	<i>Coreopsis hamiltoni</i>	-	-	1B/SC	X		B
P	m		Mt. Hamilton jewelflower	<i>Streptanibus callistus</i>	-	-	1B/SC	X		B
P	m		Mt. Tedoc linanthus	<i>Linanthus nuttallii ssp. bouellii</i>	-	-	1B/SC	X		B
P	m		Napa western flax	<i>Hesperolinon serpentinum</i>	-	-	1B	X		B
P	r		Northern California black walnut (native stands)	<i>Juglans californica var. hindsii</i>	-	-	1B/SC	X		A
P	m		Pale-yellow layia	<i>Layia heterotricha</i>	-	-	1B/SC	X		B
P	m		Panoche peppergrass	<i>Lepidium Jaredii ssp. album</i>	-	-	1B/SC	X		A
P	m		Parry's horkelia	<i>Horkelia parryi</i>	-	-	1B/SC	X		B
P	m		Pincushion navarretia	<i>Navarretia myersii</i>	-	-	1B	X		B
P	r		Point Reyes bird's-beak	<i>Cordylanthus maritimus ssp. palustris</i>	-	-	1B/SC	X		A
P	m		Rawhide Hill onion	<i>Allium tricolomense</i>	-	-	1B	X		B
P	m		Recurved larkspur	<i>Delphinium recurvatum</i>	-	-	1B/SC	X		B
P	m		Red Hills ragwort	<i>Senecio cleveandii var. heterophyllus</i>	-	-	1B	X		B
P	m		Red-flowered lotus	<i>Lotus rubriflorus</i>	-	-	1B/SC	X		B
P	m		Rose-mallow	<i>Hibiscus lasiocarpus</i>	-	-	2	X		A

(continued)

Table 2-2: Species Evaluated in the MSCS (continued)

Species Type	Goals ²	Common Name	Scientific Name	Status ³			Potential Effects of CALFED Action ⁴		Decision Criteria ⁵
				Federal	State	Other	May Be Affected	Not Likely to be Affected	
California Species of Special Concern or CNPS List 1 or 2 (continued)									
P	m	San Joaquin spearscale	<i>Atriplex joaquiniana</i>	-	-	1B/SC	X		A
P	m	Sanford's arrowhead	<i>Sagittaria sanfordii</i>	-	-	1B/SC	X		A
P	m	Saw-toothed lewisia	<i>Lewisia serrata</i>	-	-	1B/SC	X		B
P	m	Shaggyhair lupine	<i>Lupinus spectabilis</i>	-	-	1B/SC	X		B
P	m	Sharsmith's harebell	<i>Campanula sharsmithiae</i>	-	-	1B/SC	X		B
P	m	Shasta clarkia	<i>Clarkia borealis</i> spp. <i>arida</i>	-	-	1B/SC	X		B
P	m	Shasta snow-wreath	<i>Neviusia cliffonii</i>	-	-	1B	X		A
P	m	Showy madia	<i>Madia radiata</i>	-	-	1B	X		B
P	m	Silky cryptantha	<i>Cryptantha crinita</i>	-	-	1B/SC	X		B
P	m	Slough thistle	<i>Girium crassaule</i>	-	-	1B/SC	X		A
P	m	Spiny-sepaled button-celery	<i>Eryngium spinosepalum</i>	-	-	1B/SC	X		A
P	R	Suisun Marsh aster	<i>Aster lentus</i>	-	-	1B/SC	X		A
P	m	Tehama County western flax	<i>Hesperolinon tehamense</i>	-	-	1B/SC	X		B
P	m	Thread-leaved beardtongue	<i>Penstemon filiformis</i>	-	-	1B/SC	X		B
P	m	Vernal pool smallscale	<i>Atriplex persistens</i>	-	-	1B	X		B
Other Species of Concern or CNPS List 3									
M	m	Merced kangaroo rat	<i>Dipodomys beermanni dixonii</i>	-	-	SC	X		A
B	m	Black-crowned night heron (rookery)	<i>Nycticorax nycticorax</i>	-	-	SC	X		A
B	m	Great blue heron (rookery)	<i>Ardea herodias</i>	-	-	SC	X		A
B	m	Great egret (rookery)	<i>Casmerodius albus</i>	-	-	SB	X		A
B	m	Snowy egret (rookery)	<i>Egretta thula</i>	-	-	SB	X		A
B	m	Grasshopper sparrow	<i>Ammodramus savannarum</i>	-	-	SC	X		B
I	m	Mid-valley fairy shrimp	<i>Brachinecta n. sp. "mid-valley"</i>	-	-	SC	X		A
I	m	Shasta sideband	<i>Monadenia troglodytes</i>	-	-	SC	X		B
P	m	Henderson's bent grass	<i>Agrostis hendersonii</i>	-	-	3/SC	X		A
P	m	Marin knotweed	<i>Polygonum marinense</i>	-	-	3/SC	X		A
P	m	San Antonio Hills monardella	<i>Monardella antonina</i> ssp. <i>antonina</i>	-	-	3	X		A

Table 2-2: Species Evaluated in the MSCS**Notes:****¹Type:**

M = mammal, B = bird, R = reptile, A = amphibian, F = fish,
I = invertebrate, P = plant

²Species 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.

³Status:**Federal**

- E = Listed as endangered under ESA
- T = Listed as threatened under ESA
- PE = Proposed for listing as endangered under ESA
- PT = Proposed for listing as threatened under ESA
- C = Candidate for listing under ESA
- PR = Protected under the Bald and Golden Eagle Protection Act

State

- CE = Listed as endangered under CESA
- CT = Listed as threatened under CESA
- CCE = Candidate for listing as endangered under CESA
- CCT = Candidate for listing as threatened under CESA
- R = Listed as rare under California Native Plant Protection Act
- CSC = California species of special concern
- FP = Fully protected under California Fish and Game Code
- SB = Specified birds under California Fish and Game Code

Other

- 1A = CNPS List 1A
- 1B = CNPS List 1B
- 2 = CNPS List 2
- 3 = CNPS List 3
- SC = Other species of concern identified by CALFED

**⁴Potential Effects of CALFED Actions on Evaluated Species:
May be Affected:**

- X = CALFED actions may result in take of federally or state-protected species, species are associated with habitat types or occur at specific locations that may be adversely or beneficially affected by CALFED actions depending on where CALFED actions would be implemented, or species that are rare or transient in the MSCS focus area and may be affected by CALFED actions depending on when or where CALFED actions would be implemented.

Not Likely to be Affected:

- X1 = CALFED actions do not affect the species because habitat is not limiting and the species is mobile.
- X2 = Species occurs in areas that would not be affected by CALFED actions.

⁵Decision Criteria:

- A = Included because CALFED actions could affect a substantial portion of the species' range or important habitat.
- B = Included because of limited distribution or rarity of the species.
- L = Included because species is federally or state-listed as endangered, threatened, rare, or fully protected.
- P = Included because of the immediate potential to become federally or state-listed.



3: Species and Habitat Goals

The MSCS conservation goals for evaluated species fall into three categories: recovery ("R"), contribute to recovery ("r"), and maintain ("m"). The species in the recovery category have a range which falls largely within the ERP and MSCS areas. Accordingly, the CALFED agencies plan to take most of the actions needed for the recovery of those species. In this context, "recovery" means ensuring long-term survival leading to the delisting of the species. For the CALFED Program, this goal may not be feasible for some species, mainly anadromous fish, threats to which extend beyond the scope of the CALFED Program. Nineteen species (1 mammal, 2 birds, 8 fish, 2 insects, and 6 plants) are in the "recovery" category. The CALFED Program only affects a limited portion of the range, or has only a limited effect on, the species in the "contribute to recovery" category. To the extent practicable and reasonable, this means implementing part of the recovery plan for those species where one exists, or taking actions which will benefit species that do not have a recovery plan. Twenty-five species (4 mammals, 1 reptile, 10 birds, 1 fish, 1 insect, and 8 plants) fall into the "contribute to recovery" category. The 199 remaining species are in the "maintain" category. For these species, the CALFED Program will not contribute to the decline of any species, listed or unlisted, and will endeavor to benefit them to the extent practicable.

The CALFED species goals, and the measures to achieve them, are based on existing recovery plans to the extent possible. The goals are outlined in the Ecosystem Restoration Program Plan (ERPP) and the ERP Strategic Plan. CALFED habitat goals developed for the ERP provide the basis for the MSCS goals, which build on the ERP goals by looking at the needs of evaluated species. For habitats, the goals include acreage targets for habitat creation and enhancement.

The long duration of the CALFED Program (at least 30 years) requires that its conservation plans be periodically reviewed and revised to reflect actual experience, and to ensure they are adapted to optimally meet their objectives. These objectives amount to restoring and maintaining natural species habitats, primarily in the Delta, relying largely on ecological processes. Goals and objectives both for species and habitats may be modified over time as portions of the program are implemented and monitoring reveals changes in the conditions of species populations and habitats. A formal adaptive management program will be used to formulate the necessary changes.

3.1 Species Goals

The MSCS Team, working with CALFED ERP staff, recommended conservation goals – “recovery,” “contribute to recovery,” or “maintain” – for each of the evaluated species. The recommended goals have been incorporated into the overall

CALFED Multi-species Conservation Strategy

CALFED Program. CALFED will make all reasonable attempts to achieve these goals.

Below are the definitions of the goals “recovery,” “contribute to recovery,” and “maintain”. These definitions do not necessarily equate to the definitions of these terms that may be found in any statute or regulation and they are not intended to supplant any statutory or regulatory requirement. Rather, the goals are intended to be a part of the CALFED Program goals.

Recovery (“R”): For those species designated “R,” the CALFED Program has established a goal to recover the species within the CALFED ERP Ecological Management Zones. A goal of “recovery” was assigned to those species whose range is entirely or nearly entirely within the Delta and Suisun Bay areas and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. The term recover means the decline of a species is arrested or reversed, threats to the species are neutralized, and thus, the species’ long-term survival in nature is assured. In the case of most species listed under the federal ESA, recovery is equivalent, *at a minimum*, to the requirements of delisting. Certain species, such as anadromous fish, have threats outside the geographic scope or purview of the CALFED Program (i.e., harvest regulated by international laws). Thus, in some instances CALFED may not be capable of completing all actions potentially necessary to recover the species; however, CALFED will implement all necessary recovery actions within the ERP Ecological Management Zones. For other species, CALFED aims to achieve more than would be required for delisting (e.g., restoration of a species and/or its habitat to a level beyond delisting requirements). The effort required to achieve the goal of “recovery” may be highly variable between species. In sum, a goal of “recovery” implies that CALFED will undertake all actions within the ERP Ecological Management Zones and Program scope necessary to recover the species.

The CALFED Program has proposed the goal of “recovery” for the following species: Central Valley steelhead ESU, Central Valley winter-, spring- and fall-run chinook salmon, delta smelt, longfin smelt, Sacramento splittail, green sturgeon, valley elderberry longhorn beetle, Suisun ornate shrew, Suisun song sparrow, soft bird’s beak, Suisun thistle, Mason’s lilaeopsis, San Pablo song sparrow, Lange’s metalmark butterfly, Antioch Dunes evening primrose, Contra Costa wallflower, and Suisun marsh aster.

Contribute to Recovery (“r”): For those species designated “r,” the CALFED Program will make specific contributions toward the recovery of the species. The goal “contribute to recovery” was assigned to those 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. In the case of a species with a

recovery plan, this may mean implementing measures identified in the plan, that are within the CALFED Problem Area, and some of the measures outside the Problem Area. For species without a recovery plan, this would mean implementing specific measures that would benefit the species. In sum, a goal of contributing to a species' recovery implies that CALFED will undertake *some* of the actions within its geographic and Program scope necessary to recover the species.

CALFED proposes a goal of “contribute to recovery” for the following species: Sacramento perch, delta green ground beetle, giant garter snake, salt marsh harvest mouse, riparian brush rabbit, San Pablo California vole, San Joaquin Valley woodrat, least Bell's vireo, California clapper rail, California black rail, little willow flycatcher, bank swallow, western yellowbilled cuckoo, greater sandhill crane, Swainson's hawk, California yellow warbler, salt marsh common yellowthroat, Crampton's tuctoria, Northern California black walnut, delta tule pea, delta mugwort, bristly sedge, delta coyote thistle, alkali milkvetch, and Pt. Reyes birds-beak.

Maintain (“m”): For those species designated “m,” the CALFED Program will undertake actions to maintain the species (this category is less rigorous than “contribute to recovery”). The goal “maintain” was assigned to species expected to be minimally affected by CALFED actions. For this category, CALFED will ensure that any adverse effects to the species are addressed commensurate with the level of effect on the species; thus, actions may not actually contribute to the recovery of the species, but would be expected, *at a minimum*, to not contribute to the need to list an unlisted species or degrade the status of a listed species. CALFED will also maximize beneficial effects on these species to the extent practicable.

CALFED proposes the goal “maintain” for the remaining evaluated species (i.e., all evaluated species not assigned a goal of “recovery” or “contribute to recovery”). See Table 2-2 for a list of evaluated species within the MSCS focus area and the conservation goal for each.

3.2 Prescriptions for Reaching Species Goals

Species goals were established for each evaluated species along with specific prescriptions for how to measure progress toward meeting the goals. The prescription for all species with an “m” goal is to achieve an increase in or no discernable adverse effect on the size or distribution of species populations. Prescriptions for species with “R” and “r” goals are intended to provide habitat or population targets and are listed in Table 3-1. The prescription for each species provides habitat or population targets that, if met, and threats to the species are reduced, would achieve the goal for the species. Prescriptions for species goals were developed by CALFED staff, other agency staff, and other species specialists, using species recovery plans, available information and best professional

judgement. Recovery prescriptions are generally consistent with ERP restoration goals, except in instances where the MSCS cites more than one set of criteria for certain species, such as spring-run chinook salmon.

Prescriptions for meeting "R" and "r" species are subject to modification through adaptive management. Additional research, monitoring, and data interpretation may lead to revision of recovery criteria. For example, recovery plans currently being developed for many tidal marsh species may lead to new criteria for meeting recovery.

In some instances, more than one set of recovery criteria are available for a given species. The MSCS incorporates what the fish and wildlife agencies believe is the most up to date criteria that has been developed. In some cases, definitive quantifiable recovery criteria were not available. Quantitative criteria may be developed over time through additional research and adaptive management.

3.3 Relationship of the CALFED Program to Recovery Plans

The USFWS and NMFS are required by the ESA to prepare recovery plans for federally listed species, unless the appropriate agency makes a finding that preparation of a recovery plan will not promote the conservation of the listed species in question. The CDFG also may prepare recovery plans at their discretion. The CALFED Program does not replace the requirement of USFWS and NMFS to prepare plans for listed species. Many of the species evaluated by the CALFED Program have recovery plans. CALFED species' goals and conservation measures are based on existing recovery plans, when possible.

Once the CALFED Program is approved, the USFWS, NMFS, and CDFG may use the new information developed during the CALFED process either to (1) revise existing recovery plans, if appropriate, (2) serve as the recovery plan for future species listings if determined to provide all necessary conservation actions, or (3) develop new recovery plans at the time of future listings that incorporate CALFED actions into tasks necessary to achieve recovery of a listed species.

3.4 Goals for NCCP Habitats and Fish Groups

Goals for NCCP habitats described in the ERPP (CALFED 1999a) and the Strategic Plan for the ERP (CALFED 1999b) focus primarily on restoration, enhancement, and maintenance of aquatic, wetland, and riparian habitats in the Delta, Suisun Bay, and mainstems of the Sacramento and San Joaquin Rivers. Only habitat to be restored under the ERP will create new habitat area, resulting in an increase in the

Table 3-1: Prescriptions for Species with “R” and “r” Goals. Where prescriptions were taken from existing recovery plans, the recovery plan is referenced.

Species	Prescription for Species Goal
Species with “R” Goal	
Delta smelt (<i>Hypomesus transpacificus</i>)	The fall mid-water trawl survey in September and October must capture delta smelt in all zones in 2 out of 5 consecutive years and in at least 2 zones in 3 out of the 5 consecutive years, and in at least 1 zone in all 5 years; and the 5 consecutive years must include 2 sequential extreme outflow years (i.e., at least one critical or dry year followed by a critical, dry, or wet year) and the fall mid-water trawl catch for September and October must exceed 239 for 2 out of 5 years and not fall below 84 for more than 2 consecutive years. (USFWS 1995)
Longfin smelt (<i>Spirinchus thaleichthys</i>)	The recovery goal will be achieved when 1) the fall mid-water trawl surveys in September and October result in the capture of longfin smelt in all zones in 5 out of 10 years, 2) in 2 zones for an additional year, 3) in at least 1 zone during 3 of the 4 remaining years in the 10-year period with no failure to meet site criteria in consecutive years, and 4) abundance must be equal to or greater than predicted abundance for 5 of the 10-year period. (USFWS 1995)
Green sturgeon (<i>Acipenser medirostris</i>)	The recovery goal will be achieved when 1) the median population of mature fish (over 1 meter in length) has reached 1,000 fish, including 500 females over 1.3 meters in total length, over a 50-year period or for 5 generations. (USFWS 1995)
Winter-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [wr])	The mean annual spawning abundance over any 13 consecutive years will be 10,000 females. The geometric mean of the Cohort Replacement Rate over those same 13 years will be greater than 1.0. Estimates of these criteria will be based on natural production alone and will not include hatchery-produced fish. If the precision for estimating spawning run abundance has a standard error greater than 25%, then the sampling period over which the geometric mean of the Cohort Replacement Rate is estimated will be increased by 1 additional year for each 10% of additional error over 25%. (USFWS 1995)
Central Valley fall-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [fr])	Late-fall Sacramento run: Achieve species recovery by: 1) increasing the number of wild spawning fish in the Sacramento River to a mean number of 22,000 fish and maintain the population such that it does not drop below 15,000 fish for 15 years, 3 of which are dry or critical and 2) achieving juvenile survival rates that approach pre-CVP and SWP levels following years when the adult populations are fewer than 15,000 fish in the Sacramento River. San Joaquin Fall Run: Achieve species recovery by: 1) increasing the number of naturally spawning fish in the Stanislaus, Tuolumne, and Merced rivers to a median number of 20,000 fish and maintaining a 3-year running average that does not drop below 3,000 fish for 15 years, 3 of which are

(continued)

Table 3-1: Prescriptions for Species with “R” and “r” Goals (continued)

Species	Prescription for Species Goal
Species with “R” Goal (continued)	
	dry and critical and 2) achieving smolt survival rates that approach pre-CVP and SWP levels when adult numbers decline to fewer than 3,000 natural spawning fish. (USFWS 1995)
Central Valley fall-run chinook salmon (Oncorhynchus tshawytscha [fr]) (continued)	Sacramento Fall Run: Restore self-sustaining populations to all their native streams, except those above Shasta Reservoir, with numbers to exceed the average of both hatchery and wild origin from 1980-1998.
Central Valley spring-run chinook salmon (Oncorhynchus tshawytscha [sr])	<p>Recommendations are based on current scientific information presently available regarding metapopulation structure and abundance of spring-run, accepted principles of conservation biology for anadromous fish populations, and best professional judgement. Refinement of the recovery goals will be undertaken by CDFG in cooperation with NMFS following the same methodology used to develop recovery goals for the Sacramento winter-run chinook salmon (as described in the NMFS’ draft Recovery Plan for Sacramento River winter-run chinook salmon).</p> <p>Restore viable self-sustaining populations of Sacramento spring-run chinook salmon with sufficient interconnectivity throughout a significant portion of their range within the Sacramento River watershed (including but not limited to Mill, Deer, Antelope, Butte, Big Chico, Beegum, South Fork Cottonwood, Clear, and Battle creeks; Yuba River). Attainment of the recovery goals would eliminate the likelihood of extinction in the foreseeable future.</p> <p>Attainment of specified annual abundance recovery criteria shall cover a minimum 15 years which constitutes five times a generation time. The population’s annual escapement cannot drop below the critical threshold during any of the 15 consecutive years. The geometric mean of a Cohort Replacement Rate for each population of spring-run over the 15-year period will be greater than 1.0. Estimates of these criteria will be based on natural production alone and will not include hatchery-produced fish. If the precision for estimating spawning run abundance has a standard error greater than 25%, then the sampling period over which the geometric mean of the Cohort Replacement Rate is estimated will be increased by one additional year for each 10% of additional error over 25%.</p> <p>Feather River: 4,700 adult annual escapement. This is the present mitigation obligation of Feather River Hatchery for spring-run. This obligation is additional to recovery goals for naturally-reproducing populations in other Sacramento River system streams.</p> <p>Mill Creek: 2,500 adult annual escapement (The critical threshold is 250 adult annual escapement). The recent historic maximum annual adult escapement was 4,000 (CDFG 1998).</p>

(continued)

Table 3-1: Prescriptions for Species with “R” and “r” Goals (continued)

Species	Prescription for Species Goal
Species with “R” Goal (continued)	
	<p>Deer Creek: 2,500 adult annual escapement (The critical threshold is 250 adult annual escapement). The recent historic maximum annual adult escapement was 4,000 (CDFG 1998).</p> <p>Battle Creek: 1,250 adult annual escapement (The critical threshold is 250 adult annual escapement). 1952-1956 annual escapement estimates range from 1,700 to 2,200 (CDFG 1998).</p> <p>Butte Creek: 5,000 adult annual escapement (The critical threshold is 500 adult annual escapement). The recent historic maximum annual escapement of 20,000 (CDFG 1998).</p> <p>Other tributaries: The following populations need to be maintained and enhanced to the carrying capacity of each stream: Antelope, Big Chico, and Cottonwood creeks; and the Yuba River below Englebright Dam. New populations need to be established where there is a capacity to sustain minimum population sizes of 1,250 annual adult returns. This goal can be met by increasing the existing total abundance. A net additional abundance of 5,000 spring-run shall be restored to the Sacramento-San Joaquin River system. If this is to be accomplished by re-introduction, any donor wild population must be recovered before it may be used as a source for founding a new population.</p>
Central Valley steelhead (Oncorhynchus mykiss [cv]) ESU	Adopt the recovery criteria in the recovery plan (in preparation). The interim prescription is to increase Sacramento River populations to maintain a minimum of 13,000 adult steelhead spawning upstream of the Red Bluff Diversion Dam; restore self-sustaining populations of steelhead to all streams that provide suitable habitat and historically supported steelhead populations, or could be restored to provide suitable habitat with the implementation of reasonable restoration and protection measures; and increase populations such that numbers of fish of natural origin equal or exceed the average number of fish of both hatchery and natural origin from 1980-1998.
Sacramento splittail (Pogonichthys macrolepidotus)	Species recovery objectives will be achieved when 2 of the following 3 criteria are met in at least 4 of every 5 years for a 15-year period: 1) the fall mid-water trawl survey numbers must be 19 or greater for 7 of 15 years, 2) Suisun Marsh catch per trawl must be 3.8 or greater and the catch of young-of-year must exceed 3.1 per trawl for 3 of 15 years, and 3) Bay Study otter trawls must be 18 or greater AND catch of young-of-year must exceed 14 for 3 out of 15 years. (USFWS 1995)

(continued)

Table 3-1: Prescriptions for Species with “R” and “r” Goals (continued)

Species	Prescription for Species Goal
Species with “R” Goal (continued)	
Suisun ornate shrew (Sorex ornatus sinuosus), San Pablo song sparrow (Melospiza melodia samuelis), and Suisun song sparrow (Melospiza melodia maxillaris)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the Suisun ornate shrew, San Pablo song sparrow, and Suisun song sparrow and reestablish and maintain viable species' populations throughout their historic range within the ERP focus study area.
Valley elderberry longhorn beetle (Desmocerus californicus dimorphus)	Maintain and restore connectivity among riparian habitats occupied by the valley elderberry longhorn beetle and within its historic range along the Sacramento and San Joaquin rivers and their major tributaries.
Lange's metalmark butterfly (Apodemia mormo langei)	Continue protection of and expand the size of the Antioch Dunes population of the Lange's metalmark butterfly; enhance and restore suitable habitat at and in the vicinity of the Antioch Dunes; and achieve recovery goals identified in the USFWS recovery plan.
Soft bird's-beak (Cordylanthus mollis ssp. mollis)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of soft bird's-beak and reestablish and maintain viable populations throughout its historic range.
Suisun thistle (Cirsium hypophilum var. hypophilum)	Protect and maintain all extant occurrences, establish 10 new populations and increase overall population size ten-fold.
Antioch Dunes evening-primrose (Oenothera deltoides ssp. howellii) and Contra Costa wallflower (Erysimum capitatum ssp. angustatum)	Continue protection of and expand the size of the Antioch Dunes populations; enhance and restore suitable habitat at and in the vicinity of the Antioch Dunes; and achieve recovery goals identified in the USFWS recovery plan. Achieve recovery goals identified in the USFWS recovery plan.
Mason's lilaepsis (Lilaepsis masonii) and Suisun Marsh aster (Aster lentus)	Expand suitable habitat by 100 linear miles and protect at least 90% of the currently occupied habitat including 90% of high quality habitat, including occurrences in the North, South and East Delta and Napa River Ecological Management Units.
Species with “r” Goal	
Riparian brush rabbit (Sylvilagus bachmani riparius)	Protect the Caswell Memorial State Park population; protect, enhance, and expand the species' Caswell Memorial State Park population; and restore four additional self-sustaining populations in the Delta and along the San Joaquin River by 2020. (USFWS 1998b)
Salt marsh harvest mouse (Reithrodontomys raviventris)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the salt marsh harvest mouse and reestablish and maintain viable species' populations throughout its historic range in the portion of the Bay Region within the ERP focus area.

(continued)

Table 3-1: Prescriptions for Species with “R” and “r” Goals (continued)

Species	Prescription for Species Goal
Species with “r” Goal (continued)	
San Joaquin Valley woodrat (<i>Neotoma fuscipes riparia</i>)	Protect the Caswell Memorial State Park population; protect, enhance, and expand the species’ Caswell Memorial State Park population; and improve habitat connectivity and genetic interchange among isolated populations (USFWS 1998b).
San Pablo California vole (<i>Microtus californicus sanpabloensis</i>)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the San Pablo California vole and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus study area and the Delta Region.
Bank swallow (<i>Riparia riparia</i>)	Allow reaches of the Sacramento River and its tributaries that are unconfined by flood control structures (i.e., bank revetment and levees) to continue to meander freely, thereby creating suitable bank nesting substrates through the process of bank erosion.
California yellow warbler (<i>Dendroica petechia brewsteri</i>) and Little willow flycatcher (<i>Empidonax traillii brewsteri</i>)	Maintain and enhance suitable riparian corridor migration habitats and restore suitable breeding habitat within the historic breeding range of these species in the Central Valley.
California clapper rail (<i>Rallus longirostris obsoletus</i>)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the California clapper rail and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus study area.
California black rail (<i>Laterallus jamaicensis coturniculus</i>)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the California black rail and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus study area and the Delta Region.
Greater sandhill crane (<i>Grus canadensis tabida</i>)	Achieve recovery objectives identified in the Pacific Flyway Management Plan for the Central Valley population of greater sandhill cranes and Assembly Bill (AB) 1280 legislation that are applicable to the CALFED Problem Area, the Butte Sink, and other species’ use areas consistent with CALFED’s mission.
Least Bell’s vireo (<i>Vireo bellii pusillus</i>)	Achieve recovery objectives identified in the least Bell’s vireo recovery plan (USFWS 1998a) applicable to the ERP focus study area.
Saltmarsh common yellowthroat (<i>Geothlypis trichas sinuosa</i>)	Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the saltmarsh common yellowthroat and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus study area.

(continued)

Table 3-1: Prescriptions for Species with “R” and “r” Goals (continued)

Species	Prescription for Species Goal
Species with “r” Goal (continued)	
Swainson’s hawk (<i>Buteo swainsoni</i>)	Protect, enhance, and increase habitat sufficient to support a viable breeding population. The interim prescription is to increase the current estimated population of 1,000 breeding pairs in the Central Valley to 2,000 breeding pairs. This prescription will be modified based on results of a population viability analysis being conducted by CDFG.
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>)	Protect existing suitable riparian forest habitat areas within the species’ historic range and increase the area of suitable riparian forest habitat sufficiently to allow the natural expansion of the Sacramento Valley population.
Sacramento perch (<i>Archoplites interruptus</i>)	Establish multiple self-sustaining populations of Sacramento perch within the Central Valley.
Giant garter snake (<i>Thamnophis gigas</i>)	Protect the existing population and habitat within the Delta Region and restore, enhance, and manage suitable habitat areas adjacent to known populations to encourage the natural expansion of the species.
Delta green ground beetle (<i>Elaphrus viridis</i>)	Protect all known occupied habitat areas from potential adverse effects associated with current and potential future land uses and establish 3 additional populations of the delta green ground beetle within its current and/or historic range.
Northern California black walnut (<i>Juglans californica</i> var. <i>hindsii</i>) (native stands)	Protect and maintain the remaining stands, and establish 5-10 naturally regenerating black walnut stands within its historic range.
Bristly sedge (<i>Carex comosa</i>)	Research habitat requirements and use knowledge gained to develop and implement specific recovery measures.
Point Reyes bird’s-beak (<i>Cordylanthus maritimus</i> ssp. <i>palustris</i>)	Maintain, enhance and restore suitable high marsh and high marsh-upland transition habitat around San Pablo Bay.
Crampton’s tuctoria (<i>Tuctoria mucronata</i>)	Review and update recovery plan targets, protect all extant occurrences, and manage habitat to benefit Crampton’s tuctoria (e.g., manage grazing).
Delta mudwort (<i>Limosella subulata</i>) and Delta tulle pea (<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>)	Protect at least 90% of occupied habitat including 90% of high quality habitat throughout range of species to protect geographic diversity; expand suitable habitat by 100 linear miles.
Delta coyote-thistle (<i>Eryngium racemosum</i>)	Protect and maintain the 2 known existing populations and establish 2 additional self-sustaining occurrences.
Alkali milkvetch (<i>Astragalus tener</i> var. <i>tener</i>)	Protect extant populations in each vernal pool region, throughout the range of habitat conditions and genetic variability, and reintroduce species near extirpated populations.

3: Species and Habitat Goals

extent of habitat. The MSCS goals for these habitats are the same as in the ERPP, except for an additional emphasis on enhancing habitat specifically for MSCS evaluated species. Goals for upland habitats, that were not the focus of the ERPP, were developed for the MSCS. The goals for NCCP fish groups are the same as those described in the ERPP. NCCP habitat and fish group goals may be refined throughout implementation of the CALFED Program as new information is developed through the Program's adaptive management process. While these programmatic goals are suitable for the programmatic NCCP, refinements will take place as CALFED actions become better defined and Action-specific Implementation Plans (ASIPs) are completed.

Tidal perennial aquatic: The goal for tidal perennial aquatic habitat is the restoration of 8,500 acres of habitat within the Delta and Bay Regions and restoration of tidal perennial aquatic habitat within 120-260 miles of restored tidal sloughs.

Valley riverine aquatic: The goal for valley riverine aquatic habitat is to substantially increase shaded riverine aquatic and instream habitats, improve stream temperatures, and improve anadromous fish passage along the Sacramento and San Joaquin Rivers and their tributaries.

Montane riverine aquatic: The goal for montane riverine aquatic habitat is to substantially increase shaded riverine aquatic and instream habitats, improve stream temperatures, and improve anadromous fish passage along the Sacramento and San Joaquin River tributaries and North Bay tributaries.

Lacustrine: The goal for lacustrine habitat is the restoration of up to 1,600 acres adjacent to existing and restored wetlands in the Bay Region.

Saline emergent: The goal for saline emergent habitat is the restoration of 7,500-12,000 acres and enhancement of 6,200 acres, and restoration of saline emergent habitat along 35-70 miles of restored tidal sloughs in the Bay Region.

Tidal freshwater emergent: The goal for tidal freshwater emergent habitat is to increase its extent by 30,000-45,000 acres in the Delta Region through habitat restoration, restoration of tidal freshwater emergent along 85-190 miles of restored tidal sloughs, long-term protection of existing habitat associated with channel islands, and enhancement of habitat resulting from the control of non-native plants.

Nontidal freshwater permanent emergent: The goal for nontidal freshwater permanent emergent habitat is the restoration of up to 19,600 acres in the Delta Region.

Natural seasonal wetland: The goal for natural seasonal wetland habitat is to protect, enhance, or restore 100 acres of vernal pools and 500-1,000 acres of watersheds that support vernal pools in the Bay Region.

Managed seasonal wetland: The goal for managed seasonal wetland habitat is to restore 29,000-29,500 acres and enhance 290,125- 300,125 acres of habitat in all regions.

Valley/foothill riparian: The goal for valley/foothill riparian habitat is to restore habitat along 173-235 miles of river and stream channels in the Delta, Bay, and San Joaquin River Regions and 85-190 miles of restored tidal sloughs in the Delta Region, restore up to 5,520 acres of valley/foothill riparian habitat in the San Joaquin River Region and in association with restoration of channel islands in the Delta Region, and to enhance 10,500-14,500 acres in the Delta, Sacramento River, and San Joaquin River Regions.

Montane riparian: The goal for montane riparian habitat is to increase the extent and connectivity of habitat on tributary streams in the Sacramento, San Joaquin, and Bay Regions.

Grassland: The goal for grassland habitat is to restore 9,000-11,000 acres of perennial grassland in the Bay and Delta Regions and to enhance an estimated 4,900-5,400 acres in the Sacramento River Region and to replace the functions and values lost as a result of impacts on the habitat of evaluated species.

Inland dune scrub: The goal for inland dune scrub habitat is to enhance 50-100 acres of habitat to increase the population of associated evaluated species.

Upland scrub: The goal for upland scrub habitat is to replace the functions and values lost as a result of impacts on the habitat of evaluated species.

Valley/foothill woodland and forest: The goal for valley/foothill woodland and forest habitat is to replace the functions and values lost as a result of impacts on the habitat.

Montane woodland and forest: The goal for montane woodland and forest habitat is to replace the functions and values lost as a result of impacts on the habitat.

Upland cropland: The goal for upland cropland is to manage 353,933-388,933 acres of agricultural land (including seasonally flooded agricultural land) for improved wildlife habitat values.

3: Species and Habitat Goals

Seasonally flooded agricultural land: The goal for seasonally flooded agricultural land is to manage 353,933-388,933 acres of agricultural land (including upland cropland) for improved wildlife habitat values.

Anadromous fish species: The goal for the anadromous fish species community is to substantially improve anadromous fish habitat and restore and maintain populations of chinook salmon and steelhead to levels that ensure the long-term viability of individual runs and species.

Estuarine fish species: The goal for the estuarine fish species community is to substantially improve estuarine fish habitat and restore and maintain populations of covered species of estuarine fish to levels that ensure the long-term viability of species.

3.5 Changes in Goals and Prescriptions over Time

As the program proceeds over at least the next 30 years, the implementation status of CALFED Program actions will change significantly, to the extent that landscape-level changes in the Central Valley may be expected. Species populations can be predicted to change as well, but the magnitude and nature of such changes is not readily predictable. Through monitoring and adaptive management (see chapters 8 and 9), species and habitat responses to actions will be documented. This information will allow the fish and wildlife agencies (in consultation with other CALFED agencies) to determine whether species goals and objectives require modification. If a given species or suite of species responds well to targeted restoration actions, it is expected that (1) priority of restoration activities may be shifted to other species or habitats, and/or (2) species or habitat objectives may be subject to modification.

3.6 References Cited

CALFED 1999a

CALFED 1999b. Ecosystem Restoration Program Plan, contained in the 1999 Draft PEIS/EIR. Sacramento, California,

CALFED 1999b

CALFED. 1999b. Strategic Plan, Ecosystem Restoration Program, Sacramento, California.

USFWS 1995

USFWS 1995. Sacramento-San Joaquin Delta Native Fishes Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

CALFED Multi-species Conservation Strategy

USFWS 1998a

USFWS 1998a. Draft Recovery Plan for the Least Bell's Vireo. U.S. Fish and Wildlife Service, Portland, Oregon.

USFWS 1998b

USFWS 1998b. Recovery Plan for Upland Species of the San Joaquin Valley, California. U.S. Fish and Wildlife Service, Portland, Oregon.

4: CALFED Program Actions

The purpose of the CALFED 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 do so, CALFED will focus on four critical resource categories: ecosystem quality; water quality; water supply reliability; and levee system integrity. Important linkages exist between the problems and possible solutions in each of these categories. Accordingly, all four categories must be addressed concurrently: problems in one resource category cannot be pursued without addressing problems in the other resource categories.

The Preferred Program Alternative includes several strategies to achieve improvements in the Program's four critical resource categories. While many actions within the strategies are described in terms of regional implementation, the multiple benefits derived from water management actions are most clearly demonstrated if these actions are described in terms of coordinated water management throughout the Bay-Delta system. This coordinated implementation is referred to as the CALFED Water Management Strategy. Two critical parts of the continuing refinement of the Water Management Strategy include the Environmental Water Account and the Integrated Storage Investigation.

CALFED is guided by six "solution principles": (1) reduce conflicts in the system, (2) be equitable, (3) be affordable, (4) be durable, (5) be implementable and (6) pose no significant redirected impacts. The preferred solutions embodied in the CALFED Program are based on these principles.

The CALFED Program uses eight interrelated elements to address the four critical resource categories. These are Levee System Integrity, Water Quality, Ecosystem Restoration, Water Use Efficiency, Water Transfers, Watershed Programs, Storage Facilities (ground and surface water) and Through-Delta Conveyance Actions. The first of these proposes a five-part program to improve and then maintain levee system integrity. The second, water quality, aims to reduce levels of salinity, turbidity, inorganic and organic contaminants in drinking and agricultural water supplies, and to raise dissolved oxygen in flowing waters. The third, ecosystem restoration, seeks to improve and increase the natural habitats, to sustain and enhance the environments of their natural and human inhabitants. Particular attention will be given to the beneficial management of the Bay-Delta floodplains, and to preserving threatened fish populations. The fourth, water use efficiency, reflects mandates for reasonable and efficient use of water,

including specific actions to promote conservation and water recycling. The fifth, water transfers, will facilitate water transfers to ensure that water literally flows to its most valuable uses. Mechanisms to protect against third-party impacts are incorporated, including those affecting natural flows. The sixth, watershed programs, supports local watershed enhancement programs which also benefit the Bay-Delta system. The seventh, storage facilities, will be highly selective and will use ground water as well as expanded surface storage and power system reoperation. The eighth, through-Delta conveyance actions, will combine new intakes, diversions and operable barriers, and operational changes, all predicated on protection of fish populations in the Delta.

These CALFED Program actions will all conform to the adaptive management concepts being applied to the entire CALFED Program. Adaptive management is based on monitoring, assessment, and research, to provide continuous review and refinement as the CALFED Program proceeds. A staged implementation policy will enable each part of this Program to be evaluated, and modified as necessary, to ensure that it is consistent in practice with the goals of the overall CALFED Program.

4.1 CALFED Program and Preferred Program Alternative

The purpose of the CALFED 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 address problems of the Bay-Delta system within four critical resource categories: ecosystem quality; water quality; water supply reliability; and levee system integrity. Important physical, ecological, and socio-economic 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.

The CALFED Program was divided into a three-phase cooperative planning process. The process is expected to lead to a determination of the most appropriate strategy and actions necessary to reduce conflicts in the Bay-Delta system. Phase I, begun in May 1995, defined the problems of the Bay-Delta and began work on developing a range of alternatives to solve them. In addition, an initial group of actions was developed and refined into three preliminary categories of solutions to be considered in Phase II. Phase I was completed in August 1996.

CALFED is currently in Phase II, which will end at the time of the Final Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/EIR).

4: CALFED Program Actions

During Phase III, the Preferred Program Alternative will begin to be implemented, and will continue in stages over many years. This phase will include any necessary studies and site-specific environmental review and permitting. The CALFED Program includes a set of six “solution principles”. These principles are to be used collectively to measure the overall acceptability of and ability to implement the alternatives. These solution principles are the fundamental standards that guided the development of the Phase I alternatives and the refinement and evaluation of the alternatives during Phase II. The six solution principles are:

- 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 CALFED 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 Preferred Program Alternative includes several strategies to achieve improvements in the Program’s four critical resource categories: ecosystem quality; water quality; water supply reliability; and levee system integrity. While many actions within the strategies are described in terms of regional implementation, the multiple benefits derived from water management actions are most clearly demonstrated if these actions are described in terms of coordinated water management throughout the Bay-Delta system. This coordinated implementation is referred to as the CALFED Water Management Strategy. The Water Management Strategy is a flexible approach that will comprehensively and systematically evaluate the potential of all available water management tools to contribute to the achievement of Program objectives and will commit CALFED agencies to produce decisions that will aggressively use these tools in order to optimize water management for multiple CALFED objectives. The tools include water use efficiency, water transfers, water recycling, watershed management, water quality improvements, conveyance facilities, and groundwater and surface storage opportunities. These tools can all be used in varying combinations, depending on hydrologic and environmental conditions, to meet all four Program objectives.

Two critical parts of the continuing refinement of the Water Management Strategy include the Environmental Water Account and the Integrated Storage Investigation.

The Environmental Water Account (EWA) concept is that flexible management of water operations could provide the flow component of fish recovery more efficiently than a completely prescriptive regulatory approach. The EWA would access water resources throughout the Delta's watershed through a variety of actions. The EWA manager would apply these resources to provide protective actions for fish, from instream flows to reduced export pumping.

The Integrated Storage Investigation will evaluate surface storage, groundwater storage, power facility re-operation and the potential for conjunctive operation of these different types of storage to achieve multiple Program objectives. Additionally, the nature of these investigations will provide an important opportunity to prepare a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal. The Integrated Storage Investigation will enable CALFED to use existing facilities in ways that maximize Program benefits, assess the desirability of modifying other facilities where their costs exceed benefits, and consider the costs and multiple benefits of additional groundwater or surface storage in the context of an integrated Water Management Strategy.

Another characteristic shared by Program actions is a structure that facilitates adaptive management. Actions are designed according to current understanding of the system and will be monitored to confirm that understanding or to modify subsequent actions to be more effective. This adaptive management approach will increase the Program's ability to meet multiple objectives by maintaining the flexibility necessary to respond to new information, changed conditions, and improved understanding.

The Preferred Program Alternative consists of a set of broadly described programmatic actions which set the long-term, overall direction of the 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 Transfers Program, Watershed Program, Storage and Conveyance.

Even in this broad programmatic description, actions are intended to take place in an integrated framework and not independently of the other programs. While each Program element is described individually, it is understood that only through coordinated, linked, incremental investigation, analysis and implementation can CALFED effectively resolve problems in the Bay-Delta system.

4.1.1 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, 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 salty water into the Delta.

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

- Delta Levee Base Level Protection Plan - Improve and maintain Delta levee system stability to meet the Corps' PL 84-99 standard.;
- Delta Levee Special Improvement Projects - Enhance flood protection for key islands that provide state-wide benefits to the ecosystem, water supply, water quality, economics, and the Delta infrastructure;
- 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;
- 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;
- Delta Levee Risk Assessment- Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluated the consequences and develop recommendations to manage the risk; and
- Suisun Marsh - Rehabilitate Suisun Marsh levees.

4.1.2 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, and to 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 - Reduce the loads and/or impacts of bromide, total organic carbon, 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 near Hood. The Conveyance section of this document includes a discussion of this potential improvement;
- 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;

- organochlorine pesticides - Reduce the load of organochlorine pesticides in the system by reducing runoff and erosion from agricultural lands through BMPs;
- trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper portions of watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs;
- mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites;
- selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs;
- 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.
- turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay-Delta and its tributaries;
- low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen; and
- 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.

4.1.3 Ecosystem Restoration Program

The goal of the ERP is to 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. In addition, the ERP, 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 in this Multi-species Conservation Strategy. Improvements in ecosystem health will reduce the conflict between environmental water use and other beneficial uses, and allow more flexibility in water management decisions. Representative ERP actions include:

- 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 fish protection and recovery;
- restoring critical in-stream and channel-forming flows in Bay-Delta tributaries;
- improving Delta outflow during key periods;
- reconnecting Bay-Delta tributaries with their floodplains through the construction of setback levees, the acquisition of flood easements, and the construction and management of flood bypasses for both habitat restoration and flood protection;
- developing assessment, prevention and control programs for invasive species;

4: CALFED Program Actions

- 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 the removal of dams, construction of fish ladders, and construction of fish screens that use the best available technology; and
- targeting research to provide information that is needed to define problems sufficiently, and to design and prioritize restoration actions.

4.1.4 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.

Water conservation-related actions include:

- 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;
- identify in region-specific strategic plans for agricultural areas, measurable objectives to assure improvements in water management;
- expand State and federal programs to provide increased levels of planning and technical assistance to local water suppliers;
- work with the Agricultural Water Management Council 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;
- work with the California Urban Water Conservation Council to establish an urban water conservation certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures;
- help urban water suppliers comply with the Urban Water Management Planning Act.;
- identify and implement practices to improve water management wildlife areas;
- gather better information on water use, identify opportunities to improve water use efficiency, and measure the effectiveness of conservation practices; and
- conduct directed studies and research to improve understanding of conservation actions.

Water recycling actions include:

- help local and regional agencies comply with the water recycling provisions in the Urban Water Management Planning Act;
- 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; and
- provide regional planning assistance that can increase opportunities for the use of recycled water.

4.1.5 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 provide protection from third party impacts. A transfers 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. The Water Transfer Program will include the following actions and recommendations:

- 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;
- require water transfer proposals submitted to the Department of Water Resources, the U.S. Bureau of Reclamation, or the State Water Resources Control Board to include analysis of potential groundwater, socio-economic, or cumulative impacts as warranted by individual transfers;
- streamline the water transfer approval process currently used by the Department of Water Resources, the U.S. Bureau of 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;
- 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;
- improve the accessibility of State and federal conveyance and storage facilities for the transport of approved water transfers;
- clearly define carriage water requirements and resolve conflicts over reservoir refill criteria such that transfer proponents are acutely aware of the implications of these requirements;
- 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; and
- establish new accounting, tracking, and monitoring methods to aid instream flow transfers under California Water Code Section 1707.

4.1.6 Watershed Program

The Watershed Program provides assistance, financial and technical, to local watershed programs that benefit the Bay-Delta system. Watershed actions can improve reliability by shifting the timing of flows, increasing base flows and reducing peak flows. This also helps to maintain levee integrity during high flow

4: CALFED Program Actions

periods. Other watershed actions will improve water quality by reducing discharge of parameters of concern. The Watershed Program includes the following elements:

- support local watershed activities - Implement watershed restoration, maintenance, and conservation activities that support the goals and objectives of the Program including improved river functions;
- facilitate coordination and assistance - Facilitate and improve coordination and assistance between government agencies, other organizations, and local watershed groups;
- develop watershed monitoring and assessment protocols - Facilitate monitoring efforts that are consistent with CALFED's protocols and support watershed activities that ensure that adaptive management processes can be applied;
- support education and outreach - Support resource conservation education at the local watershed level, and provide organizational and administrative support to watershed programs; and
- define watershed processes and relationships - Identify the watershed functions and processes that are relevant to the CALFED goals and objectives, and provide examples of watershed activities that could improve these functions and processes.

4.1.7 Storage

Groundwater and /or 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 and/or surface water storage will be predicated upon complying with all program linkages, including:

- an assessment of groundwater storage, surface storage, re-operation of power facilities and a fish barrier assessment as part of the Integrated Storage Investigation;
- demonstrated progress in meeting the Program's water use efficiency, water reclamation and water transfer program targets;
- implementation of groundwater monitoring and modeling programs; and
- compliance with all environmental review and permitting requirements.

Subject to the above conditions, new groundwater and/or surface water storage will be developed and constructed, together with aggressive implementation of water conservation, recycling and a protective water transfer market, as appropriate to meet CALFED Program goals. During Stage 1, CALFED will evaluate and determine the appropriate mix of surface water and groundwater storage, identify acceptable projects and initiate permitting and construction if Program linkages and conditions are satisfied.

The total volume of surface and groundwater storage being assessed for this alternative range up to 6.0 million acre feet, and facility locations being considered

are located in the Sacramento and San Joaquin Valleys and in the Delta. A list of sites for further consideration is included in the Draft Programmatic EIS/EIR

4.1.8 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 proposed through-Delta conveyance facility actions include:

- construction of a new screened intake at Clifton Court Forebay with protective screening criteria;
- 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;
- implementation of the Joint Point of Diversion for the SWP and CVP, and construction of interties;
- construction of an operable barrier at the head of Old River to improve conditions for salmon migrating up and down the San Joaquin River;
- construction of operable barriers. taking into account fisheries, water quality and water stage needs in the south Delta;
- operational changes to the SWP operating rules to allow export pumping up to the current physical capacity of the SWP export facilities;
- study and evaluate a screened diversion structure on the Sacramento River (or equivalent water quality actions) as a measure to improve drinking water quality in the event that the Water Quality Program measures do not result in adequate improvements toward CALFED's drinking water quality goals. This evaluation would consider 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 Water Quality Program measures are consistently not achieving drinking water quality goals, and the evaluation demonstrates that a screened diversion of up to 4000 cfs would help achieve those goals without adversely affecting fish populations; a pilot screened diversion would be constructed. This pilot would likely include a fish screen, pumps and a channel between the Sacramento and Mokelumne River. The design, size and operating rules for this pilot facility would include an analysis of impacts to upstream and downstream migrating fish as well as impacts from habitat shifts resulting from increased flows in the eastern Delta on Delta species. Following evaluation of the pilot facility operations, a final decision would be made on whether the diversion channel and structure should continue to be used, and if so, what the operational rules and optimum size of the diversion should be.
- 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.

4: CALFED Program Actions

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

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

4.2 Staging of CALFED Program Actions

The complexity of the CALFED Program contributes to the need for staged implementation. The staging plan, with the linkages that are being developed, will reinforce CALFED Program ecosystem restoration goals. Since failure to meet objectives in one CALFED Program element may preclude implementation of linked elements, all participants share an interest in successfully meeting the objectives of each element. The staging plan allows the documentation which will tier from the programmatic MSCS, to focus initially on providing the necessary take authorization for Stage 1 actions, while further refining the MSCS for actions that will take place in later stages.

The Preferred Program Alternative consists of a set of broadly described programmatic actions which set the long-term, overall direction of the CALFED Program. It includes specified decision-making processes and criteria to ensure that future actions meet the Program's goals and objectives, and is based on a staged implementation process. Possible actions for future implementation are identified and linked with certain conditions or other mechanisms to guide decisions on these future stages. These mechanisms include agreements among agencies and stakeholders which establish a method to ensure that the CALFED Program will continue to meet the goals and objectives of the Program, and at the same time, allows the flexibility to assess the effects of previous actions, incorporate new scientific information as it becomes available, and base future decisions on this new information.

5: Effects of CALFED Actions and Conservation Measures

The MSCS analyzes the potential benefits and adverse effects of implementing CALFED Program actions and MSCS conservation measures on NCCP communities and evaluated species within the MSCS focus area. Potential indirect impacts on NCCP communities and evaluated species that could result from implementation of CALFED Program measures to improve water supply reliability in service areas are not addressed in the MSCS. The approach to analyzing potential CALFED Program impacts and then developing conservation measures included: identifying the proposed Program actions and their impacts; formulating conservation measures to compensate for adverse impacts of the Program and to achieve species goals; evaluating the overall effect of implementing CALFED Program actions and conservation measures on NCCP habitats and evaluated species; and summarizing the effect of implementing Program actions and conservation measures throughout the focus area.

The MSCS provides a programmatic-level of analysis of potential beneficial and adverse effects, both direct and indirect (except indirect effects in service areas), of proposed CALFED Program actions. Potential impacts of implementing proposed CALFED Program actions were determined by analyzing activities that could cause an adverse effect on an NCCP habitat or result in harm or mortality to individual species. The MSCS analyzes potential CALFED Program effects on each NCCP habitat and evaluated species. The impact on individual species is inferred from the impacts to its habitat.

Several extensive tables in this chapter present the impact analysis; one presents a summary of the effects on NCCP communities from implementation of the CALFED Program and conservation measures proposed in the MSCS. Other tables summarize the effects on evaluated species. Greater detail on impacts and conservation measures are provided in attachments to the MSCS. Extensive evaluation and detail are provided in separate technical reports available from CALFED on request.

Two types of conservation measures were developed under the MSCS: 1) measures to avoid, minimize, or compensate for CALFED Program impacts on NCCP communities and evaluated species; and 2) additional measures that ensure the Program meets the species conservation goals. The majority of measures designed to help the Program meet the species conservation goals incorporate and refine existing ERP and other CALFED actions. The scope, location, and timing of a particular CALFED Program action or group of actions, as well as the current status, distribution, and needs of the affected

species, will determine which conservation measures would be necessary to compensate for adverse impacts. NCCP habitat conservation measures are primarily directed at conserving the quality and quantity of natural habitats.

5.1 Approach and Methods for the Analysis of Impacts

The MSCS analyzes the potential benefits and adverse effects of implementing proposed CALFED Program actions on NCCP communities (i.e., NCCP habitats and NCCP fish groups) and evaluated species within the MSCS focus area (see Figure 1-1). Potential indirect impacts of the Program on NCCP communities and evaluated species were not evaluated for service areas (see Section 5.5 below). The approach to analyzing potential CALFED Program impacts on NCCP habitats and evaluated species was to:

- assess Program actions to identify the potential beneficial or adverse impacts of implementing actions on NCCP communities
- develop appropriate conservation measures that would compensate for potential adverse impacts on NCCP communities and evaluated species or that should be implemented to achieve conservation goals for evaluated species; and
- summarize the results of the analysis.

Procedures used to implement this approach included:

- identifying the proposed CALFED Program actions to be analyzed in the MSCS;
- combining specific proposed CALFED Program actions with similar purposes into programmatic-level actions referred to as “summary outcomes”;
- identifying the NCCP habitats with which each evaluated species is associated;
- identifying which evaluated species could be affected by implementation of CALFED Program actions;
- identifying the types of activities necessary to implement proposed CALFED Program actions that could affect an NCCP community or evaluated species;
- determining the extent and distribution of each NCCP habitat within the focus area, using available databases;
- collecting information from existing reports and species specialists necessary to formulate conservation measures to compensate for potential adverse impacts on evaluated species and to achieve species goals;
- evaluating the overall effect on NCCP communities of implementing Program actions and the MSCS conservation measures for each CALFED Program and region; and
- summarizing the overall effect of implementing all programmatic-level actions and conservation measures on each NCCP community and evaluated species throughout the focus area.

5.1.1 CALFED Program Actions Evaluated in the MSCS

The MSCS analyzes actions identified in the February 1999 revised draft Program plans. Only proposed CALFED Program actions that may affect NCCP communities and evaluated species were evaluated. CALFED Program actions

5: Effects of CALFED Actions and Conservation Measures

were reviewed to determine which of the proposed actions may affect NCCP communities and evaluated species. Proposed CALFED Program actions with little or no potential to affect NCCP communities or evaluated species are those actions that result in:

- feasibility studies or other types of “paper” (i.e., non-field) studies;
- resource management planning efforts (e.g., development of watershed management plan);
- actions implemented under local, State, or federal programs without CALFED support; and
- water quality monitoring programs.

Actions evaluated in the MSCS for each CALFED Program and region are presented in Attachment 2: Proposed CALFED Actions Evaluated in the MSCS.

The MSCS is a programmatic-level document. Thus, the potential effects of CALFED Program actions are determined through analysis of summary programmatic action outcomes (summary outcomes). Summary outcomes describe the overall anticipated effect of implementing a group of proposed CALFED Program actions that would have similar ecological effects when implemented. For example, individual ERP actions to restore tidal freshwater emergent wetland, restore tidal sloughs, restore mid-channel islands, and reduce the potential for boat wake induced erosion along tidal channels would all contribute to the summary outcome “Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland”. A proposed action may be included in more than one summary outcome if implementing the action would result in more than one ecological effect represented by different summary outcomes (e.g., actions to set back levees are included in summary outcomes that restore riparian habitat and that restore sediment supply to river channels). Summary outcomes for each Program by CALFED Region are presented in Table 5-1: Summary Programmatic Action Outcomes. CALFED Program actions included in each summary outcome are presented in Attachment 2: Proposed CALFED Actions Evaluated in the MSCS.

5.1.2 Determining the Likelihood that CALFED Program Actions Will Affect Evaluated Species

The CALFED Program was analyzed to determine if one or more proposed actions, if implemented, could affect an evaluated species. The analysis did not include an assessment of potential indirect Program impacts on NCCP

Table 5-1: Summary Programmatic Action Outcomes

MSCS User Guide: This table identifies the summary programmatic action outcomes (i.e., the probable overall effect of implementing one or more CALFED actions proposed under each Program that would have a similar ecological effect when implemented) for each CALFED region. Each summary programmatic action outcome is coded (e.g., the first summary programmatic action outcome in this table is coded "E1"). Each code is used to reference the individual actions proposed under each Program that is analyzed in the MSCS. The individual Program actions comprising each summary programmatic action outcome for each CALFED region is presented in Attachment 2: Proposed CALFED Actions Evaluated in the MSCS.

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Ecosystem Restoration Program				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	X	X	X	X
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).			X	X
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).			X	
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.	X			
E5a. Restoration of up to 7,000 acres of tidal shallow-water habitat.	X			
E5b. Restoration of at least 1,500 acres of tidal shallow-water habitat.		X		
E6. Restoration and maintenance of riverine aquatic habitats.			X	X
E7. Protection of 6,200 existing acres and restoration of 7,500-12,000 additional acres of tidal saline emergent wetland.		X		
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	X			
E9. Maintenance of existing and restoration of 200-800 acres of channel islands and associated habitats.	X			

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Ecosystem Restoration Program (continued)				
E10a. Restoration of 85-190 miles of tidal sloughs.	X			
E10b. Restoration of 35-70 miles of tidal sloughs.		X		
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	X			
E12. Restoration of up to 1,600 acres of nontidal deep open-water habitat adjacent to existing and restored wetlands.		X		
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	X			
E13b. Restoration of 1,000-1,500 acres of seasonal wetland and enhancement and management of 40,000-50,000 acres of existing seasonal wetlands for wildlife.		X		
E13c. Enhancement and management of up to 73,325 acres of existing seasonal wetlands for wildlife.			X	
E13d. Protection and enhancement of up to 172,800 acres of seasonal wetlands in the San Joaquin River Ecological Management Zone and protection and enhancement of existing seasonal wetlands elsewhere in the San Joaquin River Region.				X
E14. Protection and enhancement of up to 100 acres of vernal pools and 500-1,000 acres of surrounding lands.		X		
E15a. Restoration of 48-85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	X			
E15b. Restoration of 50-75 miles of riparian habitat along channels and reduction of populations of invasive non-native riparian plants by 50%.		X		

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Ecosystem Restoration Program (continued)				
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.			X	
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.				X
E16a. Restoration of 4,000–6,000 acres of perennial grassland.	X			
E16b. Restoration of up to 5,000 acres of perennial grassland.		X		
E16c. Restoration of perennial grassland associated with existing or restored wetlands in the American River basin.			X	
E17. Protection and enhancement of 50–100 acres of inland dune scrub.	X			
E18a. Cooperative management of 40,000–75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	X			
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.			X	
E18c. Cooperative management of up to 15,290 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.				X
E19. Restoration of flood refuge habitat areas for wildlife along levees and other lands adjacent to existing and restored habitat areas.	X			
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	X			

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Ecosystem Restoration Program (continued)				
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	X	X		
E22. Reduction in the adverse effects of diversions on fish.	X	X	X	X
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.			X	X
E24. Reduction in levels of predation on juvenile anadromous fish.	X	X	X	X
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	X	X	X	X
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.			X	X
E27a. Reduction in the concentrations and loadings of contaminants in the aquatic environment by 25%-50%.	X			
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.			X	X
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	X	X		
E29. Enhancement of habitat conditions for the riparian brush rabbit in habitat areas at and near Caswell State Park on the Stanislaus River.	X			X
E30. Enhancement of habitat conditions for the Suisun song sparrow in occupied habitat areas.		X		
Levee System Integrity Program				
L1. Improvement and maintenance of Delta levees.	X			
L2. Reduction in the risk to levee stability from subsidence.	X			

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Levee System Integrity Program (continued)				
L3. Improvement and maintenance of Suisun Marsh levees.		X		
Water Quality Program				
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	X		X	X
Q2. Maintain pathogen loadings or below mandated levels and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	X	X	X	X
Q3. Reduction of mercury loadings in water and sediment.			X	
Q4. Reduction of pesticide loadings in the aquatic environment.	X	X	X	X
Q5. Management of salinity levels in the aquatic environment to improve water quality.				X
Q6. Reduction in selenium concentrations and loadings to the aquatic environment.				X
Q7. Reduction of cadmium, copper, and zinc loadings to levels which do not adversely affect Bay-Delta species or beneficial uses of water.	X	X	X	X
Q8. Reduction of sediment loadings to levels which do not adversely effect beneficial uses of surface water.		X		X
Water Use Efficiency Program				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	X	X	X	X
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	X	X	X	X

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Water Use Efficiency Program (continued)				
W3. Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies.	X	X	X	X
W4. Support development and implementation of water recycling projects.	X	X	X	X
Water Transfer Program				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	X	X	X	X
Watershed Management Program				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	X	X	X	X
Conveyance Facilities				
C1. Construct and operate modifications to existing south Delta conveyance features.	X			
C2. Construct and operate modifications to existing north Delta conveyance features.	X			
C3. Construct and operate an isolated conveyance facility from the Sacramento River along the eastern side of the Delta to Clifton Court Forebay.	X			
Storage Facilities				
S1. Construct and operate enlarged or new surface storage facilities.	X		X	X
S2. Construct and operate new groundwater storage facilities.			X	X
Conveyance and Storage Operations				
O1. Implement operating criteria needed to improve water management for beneficial uses.	X	X	X	X

Table 5-1: Summary Programmatic Action Outcomes (continued)

Summary Programmatic Action Outcomes	Applicable CALFED Region			
	Delta	Bay	Sacramento River	San Joaquin River
Conveyance and Storage Operations (continued)				
02. Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits.	X	X	X	X

5: Effects of CALFED Actions and Conservation Measures

communities and species in service areas. The CALFED Program was considered to affect an evaluated species if:

- a species could be present in a location that could be affected by CALFED Program actions;
- implementation of one or more actions could result in take of federally or state-protected species; or
- implementation of CALFED Program actions would change the extent or quality of habitat potentially occupied by a species.

Species considered not likely to be affected by CALFED Program actions are those that: 1) are highly mobile and unlikely to be sensitive to disturbance, and for which habitat is not limiting and 2) occur in locations that would not likely be affected by CALFED Program actions. The determination of whether a species could be affected by implementation of proposed actions is presented in Table 2-2, the list of evaluated species.

5.1.3 Evaluated Species Associated with NCCP Habitats

Biologists familiar with the habitat requirements of evaluated species determined the NCCP habitats with which each species is associated. For use in this programmatic-level of analysis, a species was considered to be associated only with NCCP habitats in which the species regularly occurs and which are essential to maintaining the species' populations. Consequently, NCCP habitats that may be used by a species only under limited or special circumstances (e.g., giant garter snakes are dependent on wetland habitats, but will use grassland habitat immediately adjacent to wetlands for hibernation and as refuge during floods) were not considered to be a habitat type with which the species is associated. These limited or special habitat requirements would be considered in assessing potential impacts on evaluated species for individual projects proposed under the CALFED Program. The limited or special habitat requirements for each evaluated species are described in species accounts that have been prepared for each species (MSCS Technical Report entitled, Species Accounts for MSCS Evaluated Species). NCCP habitats with which species are associated are presented in Attachment 3: Evaluated Species Associated with NCCP Habitats.

5.1.4 Impact Analysis

The MSCS provides a programmatic-level of analysis of potential beneficial and adverse effects, both direct and indirect, of proposed CALFED Program actions as embodied in the summary outcomes for each NCCP community. Because the analysis identifies potential effects of implementing all actions associated with each summary outcome (Table 5-1), only a subset of the

potential effects identified for a summary outcome may be associated with implementing a particular action.

The MSCS directly assesses potential CALFED Program impacts of each summary outcome by CALFED region on NCCP habitats and fish groups. The impacts on evaluated species other than fish species are assessed indirectly, assuming that impacts on a habitat also affect the species that are dependent on that habitat (i.e., implementation of actions that increase or improve the available habitat for a species would be considered to be a beneficial impact and actions that would decrease or degrade the available habitat for a species would be considered to be an adverse impact). The analysis also assumes that summary outcomes (Table 5-1) will be achieved directly through implementation of proposed CALFED Program actions or as a result of modifying actions in the future based on monitoring and the adaptive management process (see Section 5.4 below, Chapter 8: Monitoring, and Chapter 9: Adaptive Management).

How Impacts Occur: Potential impacts on NCCP communities and evaluated species of implementing CALFED Program actions were determined by analyzing activities that could be associated with implementing summary outcomes and that could cause a direct or indirect adverse effect on an NCCP habitat or result in harm or mortality to an evaluated species. These activities, termed impact mechanisms, are presented in Table 5-2.

Many CALFED Program actions are designed specifically to benefit evaluated species (e.g., actions proposed under the ERP and Water Quality Program). Impact mechanisms described in Table 5-2 that could be associated with implementing actions to achieve long-term benefits for evaluated species may also adversely affect evaluated species. For many of these actions, the potential adverse effects would be temporary. For example, actions necessary to restore tidal shallow-water habitat to benefit fish species dependent on the Delta could result in construction-related disturbances that cause species to avoid suitable habitat areas or that could cause a temporary reduction in water quality as a result of operating equipment in and adjacent to tidal aquatic habitat areas. The overall level of beneficial effects of restoring tidal shallow-water habitat on fish species, however, are expected to be greater than the overall level of adverse effects associated with implementing the tidal restoration actions.

NCCP Communities and Evaluated Species: The analysis of effects on NCCP communities and evaluated species was conducted by biologists familiar with the NCCP habitats in the focus area; the distribution, ecology, habitat requirements, and status of associated evaluated species; and proposed

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes

MSCS User Guide: This table describes the impact mechanisms (i.e., the activities that could be associated with implementing Program actions and that could result in an adverse effect on NCCP communities or evaluated species) potentially associated with implementing actions associated with each summary outcome. Summary outcome codes corresponding to summary outcomes specific to each CALFED Region are shown in parentheses and correspond to the summary outcome codes and descriptions shown in Table 5-1 and Attachment 2: Proposed CALFED Actions Evaluated in the MSCS. The impact mechanisms described in this table were used to identify potential adverse effects on NCCP communities and evaluated species.

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program	
Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years (E1).	1. Changes in timing, stage, and velocity of flows could be sufficient to alter habitat along channels..
Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats) (E2).	1. In-channel construction activity. 2. Demolition and construction activities associated with setting back levees. 3. Demolition activities associated with removal of bank protection or other structures.
Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures) (E3).	1. Changes in timing, stage, and velocity of flows.
Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow (E4).	1. Changes in timing, stage, and velocity of flows. 2. Changes in patterns of flow in Delta channels. 3. In-channel construction activity. 4. Grading, excavation, and other construction activity associated with restoration of habitat. 5. Demolition and construction activities associated with setting back levees.
Restoration of tidal shallow-water habitat (E5a and E5b).	1. In-channel construction activity. 2. Placement of fill and other construction activity associated with restoration of habitat. 3. Demolition and construction activities associated with setting back or breaching levees and dikes. 4. Construction activities associated with modifying or constructing new levees. 5. Introduction of tidal exchange to existing agricultural and other nontidal habitats.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Restoration and maintenance of riverine aquatic habitats (E6).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back levees. 3. Demolition activities associated with removal of bank protection or other structures. 4. Collection and planting riparian vegetation. 5. Excavation, grading, and other construction activities associated with restoration of channels and overflow channels. 6. Change in floodplain hydrologic patterns.
Restoration of tidal emergent wetland habitats (E7 and E8).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back or breaching levees and dikes. 3. Construction activities associated with modifying or constructing new levees. 4. Collection and planting of emergent vegetation. 5. Introduction of tidal exchange to existing agricultural and other nontidal habitats. 6. Chemical or mechanical control of non-native invasive plants.
Maintenance of existing and restoration of up to 200 acres of channel islands and associated habitats (E9).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Placement of riprap or other structures to prevent or reduce erosion of islands. 3. Placement of fill material to create or enlarge channel islands.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Restoration of tidal sloughs (E10a and E10b).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back or breaching levees and dikes. 3. Construction activities associated with modifying or constructing new levees. 4. Excavation, grading, and other construction activities associated with restoration of tidal sloughs. 5. Introduction of tidal exchange to existing agricultural and other nontidal habitats. 6. Chemical or mechanical control of non-native invasive plants.
Restoration of up to 19,600 acres of nontidal freshwater emergent wetland (E11).	<ol style="list-style-type: none"> 1. Excavation, grading, and other construction activities associated with restoration of nontidal emergent wetlands. 2. Conversion of agricultural and natural habitats to emergent nontidal wetlands. 3. Chemical or mechanical control of non-native invasive plants.
Restoration of up to 1,600 acres of nontidal deep open-water habitat adjacent to existing and restored wetlands (E12).	<ol style="list-style-type: none"> 1. Excavation, grading, and other construction activities associated with restoration of lacustrine habitats. 2. Conversion of agricultural and natural habitats to lacustrine habitats.
Enhancement and restoration of seasonal wetlands for wildlife (E13a, E13b, E13c, and E13d).	<ol style="list-style-type: none"> 1. Excavation, grading, and other construction activities associated with restoration of seasonal wetlands and improvement to water conveyance and other management infrastructure. 2. Conversion of agricultural and natural habitats to seasonal wetlands. 3. Change in land use practices (e.g., modification of existing livestock grazing patterns). 4. Chemical or mechanical control of non-native invasive plants.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Protection and enhancement of up to 100 acres of vernal pools and 500–1,000 acres of surrounding lands (E14).	<ol style="list-style-type: none"> 1. Excavation, grading, and other construction activities associated with restoration of vernal pools and their watersheds.
Protection, enhancement, and restoration of riparian habitat along channels (E15a, E15b, E15c, and E15d).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back or breaching levees and dikes. 3. Construction activities associated with modifying or constructing new levees. 4. Excavation, grading, and other construction activities associated with restoration of riparian habitats. 5. Conversion of agricultural and natural habitats to riparian habitat. 6. Change in land use practices (e.g., modification of existing livestock grazing patterns). 7. Chemical or mechanical control of non-native invasive plants.
Restoration of perennial grassland (E16a, E16c, and E16d).	<ol style="list-style-type: none"> 1. Chemical or mechanical control of non-native invasive plants. 2. Grading and other ground disturbance activities associated with reestablishment of perennial grasses and associated vegetation.
Protection and enhancement of 50-100 acres of inland dune scrub (E17).	<ol style="list-style-type: none"> 1. Chemical or mechanical control of non-native invasive plants. 2. Placement of fill, grading, and other ground disturbance activities associated with reestablishment of inland dunes. 3. Change in land use practices (e.g., modification of existing livestock grazing patterns).
Cooperative management of agricultural lands to enhance habitat values for waterfowl and other associated species (E18a, E18b, and E18c).	<ol style="list-style-type: none"> 1. Change in agricultural cropping patterns and practices. 2. Construction and other activities necessary to improve agricultural infrastructure.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Restoration of flood refuge habitat areas for wildlife along levees and other lands adjacent to existing and restored habitat areas (E19).	<ol style="list-style-type: none"> 1. Chemical or mechanical control of non-native invasive plants. 2. Grading and other ground disturbance activities associated with reestablishment of perennial grasses and associated vegetation.
Reduction in the adverse effects of dredging on estuarine aquatic habitats (E20).	None.
Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta (E21).	None.
Reduction in the adverse effects of diversions on fish (E22).	<ol style="list-style-type: none"> 1. Demolition and construction activities associated with removing existing and installing new screens, and consolidating or relocating diversions.
Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement (E23).	<ol style="list-style-type: none"> 1. Demolition and/or construction activities associated with removing barriers to fish passage, modifying existing structures to improve fish passage, and constructing new structures to improve fish passage around barriers.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Reduction in levels of predation on juvenile anadromous fish (E24).	<ol style="list-style-type: none"> 1. Demolition and/or construction activities associated with removal or modification of in-channel structures to remove non-native predator habitat. 2. Fill or grading activities associated with eliminating the hydrologic connectivity of gravel pits on floodplains with active stream channels.
Reduction in the adverse effects of harvest on fish and wildlife populations (E25).	None.
Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes (E26).	<ol style="list-style-type: none"> 1. Construction and other activities associated with construction
Reduction in the concentrations and loadings of contaminants in the aquatic environment (E27a and E27b).	<ol style="list-style-type: none"> 1. In-channel disturbances associated with to remove sources of contaminants. 2. Change in agricultural land use practices associated with reductions in use of pesticides.
Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas (E28).	None.
Enhancement of habitat conditions for the riparian brush rabbit in habitat areas at and near Caswell State Park on the Stanislaus River (E29).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back or modifying levees. 3. Excavation, grading, and other construction activities associated with restoration of riparian habitats. 4. Conversion of agricultural and natural habitats to riparian habitat. 5. Chemical or mechanical control of non-native invasive plants. 6. Activities associated with the capture and handling of riparian brush rabbits.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Ecosystem Restoration Program (continued)	
Enhancement of habitat conditions for the Suisun song sparrow in occupied habitat areas (E30).	<ol style="list-style-type: none"> 1. In-channel construction activity. 2. Demolition and construction activities associated with setting back or breaching levees and dikes. 3. Construction activities associated with modifying or constructing new levees. 4. Collection and planting of emergent vegetation. 5. Introduction of tidal exchange to existing agricultural and other nontidal habitats. 6. Chemical or mechanical control of non-native invasive plants.
Levee System Integrity Program	
Improvement and maintenance of Delta levees (L1).	<ol style="list-style-type: none"> 1. Demolition, construction, and grading activities. 2. Activities associated with long-term maintenance of levees.
Reduction in the risk to levee stability from subsidence (L2).	<ol style="list-style-type: none"> 1. Demolition, construction, and grading activities.
Improvement and maintenance of Suisun Marsh levees (L3).	<ol style="list-style-type: none"> 1. Demolition, construction, and grading activities. 2. Activities associated with long-term maintenance of levees. 3. Reduction in salinity levels causing habitat conversion.
Water Quality Program	
Reduction of oxygen-depleting substances in the aquatic environment (Q1).	None.
Maintain pathogen loadings or below mandated levels and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses (Q2).	<ol style="list-style-type: none"> 1. Reduction in the total organic carbon available to primary foodweb organisms.
Reduction of mercury loadings in water and sediment (Q3).	<ol style="list-style-type: none"> 1. In-channel disturbances associated with to remove sources of contaminants.
Reduction of pesticide loadings in the aquatic environment (Q4).	<ol style="list-style-type: none"> 1. Change in agricultural land use practices associated with reductions in use of pesticides.
Water Quality Program (continued)	
Management of salinity levels in the aquatic environment to improve water quality (Q5).	<ol style="list-style-type: none"> 1. Change in land use practices and cropping patterns on agricultural lands. 2. Changes in timing, stage, and velocity of flows. 3. Changes in patterns of flow in Delta channels.
Water Quality Program (continued)	
Reduction in selenium concentrations and loadings to the aquatic environment (Q6).	<ol style="list-style-type: none"> 1. Change in land use practices and cropping patterns on agricultural lands.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water (Q7).	1. In-channel disturbances associated with to remove sources of contaminants.
Reduction of sediment loadings to levels which do not adversely effect beneficial uses of surface water (Q8).	None.
Water Use Efficiency Program	
Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses (W1).	1. Reduction in agricultural irrigation and drainage water to support natural habitat areas. 2. Temporary disturbances associated with construction and related activities.
Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs (W2).	1. Reduction in agricultural irrigation and drainage water to support natural habitat areas. 2. Temporary disturbances associated with construction and related activities.
Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies (W3).	None.
Support development and implementation of water recycling projects (W4).	None.
Water Transfer Program	
Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market (T1).	1. Reduction in water to support natural habitat areas. 2. Changes in the timing, stage, velocity, and/or duration of flows.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Watershed Management Program	
Fund and implement watershed restoration, maintenance, conservation, and monitoring activities (M1).	1. Construction or management-related activities that result in removal or alteration of vegetation.
Conveyance Facilities	
Construct and operate modifications to existing south Delta conveyance features (C1).	1. Change in timing and patterns of water movement through the Delta. 2. Change in tidal stage. 3. Demolition, construction, excavation, grading, and maintenance activities associated with construction and operation of facilities. 4. Conversion of agricultural and native habitats to aquatic habitat.
Construct and operate modifications to existing north Delta conveyance features (C2).	1. Change in timing and patterns of water movement through the Delta. 2. Change in tidal stage. 3. Demolition, construction, excavation, grading, and maintenance activities associated with construction and operation of facilities. 4. Conversion of agricultural and native habitats to aquatic habitat.
Construct and operate an isolated conveyance facility from the Sacramento River along the eastern side of the Delta to Clifton Court Forebay (C3).	1. Change in timing and patterns of water movement through the Delta. 2. Change in tidal stage. 3. Demolition, construction, excavation, grading, and maintenance activities associated with construction and operation of facilities. 4. Conversion of agricultural and native habitats to aquatic habitat.

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

Table 5-2: Impact Mechanisms Potentially Associated with Summary Outcomes (continued)

Summary Programmatic Action Outcome	Impact Mechanisms Associated with Program Implementation
Storage Facilities	
Construct and operate enlarged or new surface storage facilities (S1).	<ol style="list-style-type: none"> 1. Demolition, construction, excavation, grading, and maintenance activities associated with construction and operation of facilities. 2. Conversion of agricultural and native habitats to lacustrine habitat. 3. Changes in riverflow downstream of storage reservoirs. 4. Increased levels recreation related activity.
Construct and operate new groundwater storage facilities (S2).	<ol style="list-style-type: none"> 1. Demolition, construction, excavation, grading, and maintenance activities associated with construction and operation of facilities. 2. Conversion of agricultural and native habitats to low quality seasonal wetlands.
Conveyance and Storage Operations	
Implement operating criteria needed to improve water management for beneficial uses (O1).	<ol style="list-style-type: none"> 1. Changes in timing, stage, and/or duration of flows as a result of reoperation of the SWP and CVP .
Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits (O2).	<ol style="list-style-type: none"> 1. Changes in timing, stage, and/or duration of flows as a result of reoperation of the SWP and CVP .-

Note: Codes in () are summary programmatic action outcome codes and correspond to the summary programmatic action outcomes for each CALFED Region that are presented in Table 5-1 and Attachment 2.

5: Effects of CALFED Actions and Conservation Measures

CALFED Program actions. CALFED staff, staff from other agencies, independent species specialists, and CALFED work groups contributed to this effort. Where the actions that comprise the summary outcomes lack specificity (e.g., specific locations where the action may be implemented or the magnitude of the action), potential effects on an NCCP community and associated species are characterized as a general statement of likely effects (e.g., potential for an increase in habitat area). Summary outcomes were deemed to have no potential effect on an NCCP habitat and associated species if the proposed actions comprising the summary outcome would not result in a discernible change in numbers or distribution of a species or the continuity, quantity, quality, or distribution of its habitat.

Prescriptions for Reaching Species Goals: Species goals have been established for each evaluated species along with prescriptions for how to measure progress toward meeting the goal (see Chapter 3: Species and Habitat Goals). This analysis assumes that the objectives embodied in the prescriptions will be achieved through implementation of CALFED Program actions and MSCS conservation measures or as a result of modifying actions in the future based on monitoring and the adaptive management process (see Chapter 8: Monitoring and Chapter 9: Adaptive Management).

Extent of Existing NCCP Habitats: Two regional habitat data bases were used to estimate the existing extent of NCCP habitats within the focus area: the California Central Valley Wetlands and Riparian Geographic Information System (GIS) and the California Gap Analysis landcover GIS databases. Each of these was created for a different purpose and has its advantages and disadvantages.

The advantages of the California Central Valley Wetlands and Riparian Geographic Information System (hereafter: Wetlands GIS) are that it was created to represent riparian and wetland habitat types (including agricultural wetland types), that are of great importance to the CALFED Program and is based on relatively recently acquired imagery (1993). The disadvantages of the data for use in MSCS are that upland habitats such as woodlands and shrub types are not differentiated and that habitats for portions of the focus area above the valley floor (e.g., roughly 300ft elevation) have not been mapped.

The advantages of the California Gap Analysis landcover GIS database (hereafter Gap GIS) are that the database covers the entire focus area and that upland types have been differentiated. The disadvantages of use of the Gap GIS data for the MSCS are that wetland and riparian features which are of great importance to the CALFED Program, in particular narrow strips of these habitat types, are under-represented and that the data is based on somewhat older imagery (1990). The Gap GIS uses a 40-hectare (99-acre) minimum mapping

unit for wetlands, and a 100-hectare (247-acre) minimum mapping unit for upland types.

The Wetlands GIS was developed to map wetlands, woody riparian areas, and surrounding land cover to support cooperative conservation planning and wetland resource protection efforts of State, federal, and local agencies and private organizations. The Wetlands GIS database is an ARC/INFO grid with 31 meter grid cells, based on classified Landsat Thematic Mapper and SPOT Multispectral Satellite Imagery. A multi-temporal image processing technique was used on imagery from the summer (end of June- early July 1993) and winter (November 1986 - January 1993). For the northern San Joaquin River Region, the most recent obtainable Landsat winter data were for 1986 and these data were supplemented with more recent SPOT Multispectral imagery for November 1990. A number of ancillary data sources were used to aide the classification of the imagery into habitat types, these included: National Wetland Inventory, Department of Conservation Farmlands Mapping and Monitoring, San Francisco Estuary Institute Baylands Atlas, Natural Diversity Database, and DFG River Reach Hydrography Data.

The habitat classification used in the Wetlands and Riparian GIS differs from NCCP habitat type classifications (see MSCS Technical Report entitled, *Correlation of NCCP Habitats with Other Classification Systems*). The GIS database includes only one aquatic type, while the MSCS addresses four aquatic types. Furthermore, several terrestrial types in the GIS database were combined for area calculation purposes to provide a classification that was more similar to the MSCS classification.

Table 5-3 presents the extent of the NCCP habitats in ERP ecological management zones and units for each CALFED region (Figure 1-1) according to the Wetlands GIS database.

The Gap GIS landcover database was created by the Department of Geography of the University of California, Santa Barbara, as part of the California Gap Analysis Project coordinated by U.S. Geological Survey. The habitats of the Gap GIS were mapped using a 1990 Thematic Mapper satellite image, resampled to 100 x 100-meter cell size, supplemented with 1990 high altitude aerial photography that was overlaid with existing vegetation maps, land use maps and forest inventory data. Polygons of the land cover GIS layer have been attributed according to several systems, but the California Wildlife Habitat Relationships (WHR) habitat types were used for calculating acreages of NCCP habitats, because the WHR system best matched the level of detail of the NCCP habitat types (see MSCS Technical Report entitled *Correlation of NCCP Habitats with Other Classification Systems*).

Table 5-3. Existing Extent (in acres) of NCCP Habitats Derived from the California Central Valley Wetlands and Riparian GIS(1)

Region	Ecological Management Zone	Ecological Management Unit	Aquatic (2)	Saline emergent	Freshwater permanent emergent wetland(3)	Seasonal wetland(4)	Valley/ foothill riparian	Grassland	Woodland, forest and scrub(5)	Seasonally flooded agricultural lands(6)	Upland cropland	Orchards and vineyards(7)	Developed and disturbed(7)	Area Covered by Data (%)
Delta	Delta Basin	Central and West Delta	34,200	1,100	5,100	500	1,000	33,700	300	18,700	94,700	4,200	18,900	100
		East Delta	3,500	0	1,100	800	600	11,000	2,200	6,300	58,700	3,200	12,000	100
		South Delta	5,700	0	600	400	900	40,300	300	2,100	98,000	7,100	20,800	100
		North Delta	11,000	1	4,700	4,800	1,400	42,300	1,600	15,000	118,200	9,000	29,500	100
		Total	54,300	1,100	11,500	6,200	3,900	127,200	4,400	42,000	389,800	23,500	81,100	100
Bay	Suisun Marsh and S. F. Bay	Suisun Bay	39,800	33,300	3,100	12,900	300	69,500	1,100	88	1,400	4,600	28,400	70
		Napa River	12,100	4,900	1,100	500	900	27,900	5,500	29	2,400	22,600	18,900	36
		Petaluma River	1,900	4,400	400	200	300	51,900	5,800	19	3,800	84	9,300	83
		San Pablo Bay	70,900	2,100	7	2	4	61	62	0	1	0	300	100
		Sonoma Creek	900	1,500	200	300	400	20,900	1,400	100	4,900	5,200	6,000	39
		Total	125,700	46,100	4,800	13,800	1,900	170,300	13,900	300	12,600	32,600	62,800	59
		Sacramento River	Sacramento River	Sacramento River	13,100	0	1,900	2,000	15,300	20,400	400	27,900	54,200	43,000
American River Basin	900			0	900	2,000	1,200	112,700	14,100	67,500	19,700	800	50,400	98
Morrison Creek Watershed	2,200			0	300	500	3,000	89,500	19,500	200	12,200	900	56,000	99
Butte Basin	Antelope Creek		200	0	78	93	100	4,500	600	74	3,000	5,900	1,000	7
	Butte Creek		8	0	7	2	16	5,500	300	0	0	2	200	4
	Butte Sink		1,700	0	6,400	11,700	3,000	52,300	7,600	132,700	46,500	19,800	18,300	97
	Dear Creek		87	0	35	17	400	3,100	89	100	1,500	2,100	500	5
	Mill Creek		100	0	18	70	600	8,100	100	33	1,100	1,200	600	9
	Paynes Creek													0
	Pine, Rock & Big Chico Creeks		600	0	200	200	900	37,600	5,600	6,500	6,100	18,400	12,500	35
	Total		500	0	34	18	300	8,300	400	84	6,600	3,100	4,900	11
Colusa Basin	Elder Creek		3,500	0	3,900	14,400	600	127,800	2,000	188,400	169,600	14,900	125,200	81
	South Colusa Basin		1,100	0	100	300	200	8,200	200	1,300	20,400	7,400	9,400	68
	Stony Creek		1,100	0	66	46	1,000	35,800	800	300	14,600	13,800	9,200	41
	Total		39,100	0	19,600	39,300	37,600	786,300	77,600	608,000	561,100	191,900	496,700	49
	Upper Cottonwood Creek													0
Feather River/Sutter Basin	Bear River		600	0	600	1,000	1,200	45,300	1,500	20,000	16,700	9,600	10,500	100
	Feather River		7,500	0	2,100	700	6,800	21,100	300	6,200	18,800	17,900	12,700	100
	Honcut Creek		400	0	300	800	800	38,000	9,600	25,100	8,100	3,800	6,700	52
	Sutter Basin		1,400	0	1,400	2,800	600	31,900	8,300	91,200	50,100	16,400	25,800	100
	Yuba River		1,700	0	200	90	400	20,900	2,500	1,000	3,100	3,400	6,100	24
	Total		11,600	0	6,600	5,300	6,000	206,000	43,700	32,300	95,000	67,900	47,000	80
North Sacramento Valley Basin	Bear Creek													0
	Battle Creek													0
	Clear Creek													0
	Cow Creek													0
	North Sacramento Valley													0
Yolo Basin	Cache Creek	800	0	300	1,200	300	10,000	600	4,600	15,400	1,800	14,700	62	
	Putah Creek	200	0	200	91	200	13,300	1,400	4,900	28,200	2,900	23,400	91	
	Willow Slough	1,000	0	300	500	84	17,400	500	21,900	40,600	2,000	28,800	90	
	Solano	500	0	100	900	500	74,400	1,100	8,100	24,500	2,500	41,200	94	
	Total	39,100	0	19,600	39,300	37,600	786,300	77,600	608,000	561,100	191,900	496,700	49	
San Joaquin River	San Joaquin River	5,200	0	2,800	1,800	3,800	40,700	100	3,500	47,700	17,700	18,900	87	
	East San Joaquin Basin	Chowchilla/Fresno Rivers	3,900	0	1,700	1,800	600	223,700	1,500	17,300	132,100	151,000	127,900	78
		East San Joaquin Basin												0
		Merced River	1,600	0	500	200	1,800	68,900	300	700	43,400	72,000	38,900	71
		Stanislaus River	1,000	0	500	300	2,200	27,900	400	300	22,600	42,900	17,800	77
		Tuolumne River	7,800	0	600	500	2,300	95,800	1,700	1,600	77,000	84,700	65,000	80
	East Side Delta Tributaries	Cosumnes River	1,900	0	800	1,500	3,400	169,700	4,200	600	37,700	9,000	10,000	29
		Eastside Delta Lowlands Fan	3,800	0	400	1,400	2,600	204,200	3,900	6,100	118,800	94,300	51,900	77
	West San Joaquin Basin	Lower West San Joaquin Basin	13,800	0	9,900	31,900	600	156,600	600	39,900	175,600	33,200	93,800	83
		Upper West San Joaquin Basin	800	0	41	99	7	49,800	70	19	4,800	2,600	10,300	9
Total	39,700	0	17,200	39,500	17,400	1,037,400	12,800	69,900	657,600	507,400	432,500	59		

- Notes:
- (1) Source: California Department of Fish and Game (1997) based on 1993 Landsat Thematic Mapper imagery (blank cells indicate lack of data)
 - (2) Includes tidal perennial aquatic, valley riverine aquatic and lacustrine
 - (3) Includes tidal freshwater emergent and nontidal freshwater permanent emergent
 - (4) Includes natural seasonal wetland and managed seasonal wetland
 - (5) Includes inland dune scrub, upland scrub, and valley/foothill woodland and forest
 - (6) Includes some permanently flooded agricultural land
 - (7) Not NCCP habitats

Table 5-4 presents the extent of the NCCP habitats in ERP ecological management zones and units for each CALFED region (Figure 1-1) according to the Gap GIS landcover database. Estimates for wetland and riparian acreages tend to be substantially lower for these data (Table 5-4) than for the Wetland GIS (Table 5-3)

5.2 Conservation Measures

Two types of conservation measures were developed under the MSCS: 1) measures designed to avoid, minimize, or compensate for potential CALFED Program impacts on NCCP communities and evaluated species (applicable to species with “m”, “r”, and “R” conservation goals); and 2) additional measures to ensure that the Program meets the species conservation goals. The majority of the conservation measures designed to help the Program meet the species conservation goals incorporate and refine existing ERP and other CALFED actions.

Not all conservation measures to avoid, minimize, or compensate for CALFED Program impacts on NCCP communities and evaluated species will be applicable to specific CALFED Program actions. The scope, location, and timing of a CALFED Program action, as well as the current status, distribution, and needs of the affected species, will determine which conservation measures apply. The appropriate conservation measures will be incorporated in the Action-specific Implementation Plan (ASIP) for the particular CALFED Program action (see Chapter 7).

5.2.1 Conservation Measures for NCCP Communities

Tables summarizing the types of conservation measures for each NCCP community are presented in Attachment 4: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures. These tables do not indicate the summary outcome(s) to which a particular conservation measure may apply, but rather present all of the types of conservation measures that may need to be implemented if all proposed CALFED actions embodied in the summary outcomes (Table 5-1) are implemented. Detailed descriptions of conservation measures for each NCCP community by CALFED region and summary outcome are presented in the MSCS Technical Report entitled, Evaluation Tables and MSCS Conservation Measures for NCCP Communities.

NCCP habitat conservation measures, with the exception of those developed for upland cropland and seasonally flooded agriculture, are primarily directed

Table 5-4. Existing Extent of NCCP Habitats (in acres) Derived from the California Gap Analysis Landcover GIS

Region	Ecological Management Zone	Ecological Management Unit	Tidal perennial aquatic	Valley riverine aquatic	Lacustrine	Saline emergent	Freshwater permanent emergent (1)	Valley / Foothill riparian	Montane riparian	Grassland	Upland scrub	Valley / foothill woodland and forest	Montane woodland and forest	Cropland (2)	Orchard and vinyard (3)	Barren and urban (3)		
Delta	Delta Basin	Central And West Delta	10,000	21,600	4,300		6,600	600		6,100				134,000	12,000	17,800		
		East Delta		2,400	200		500	500		200				82,100	400	12,800		
		South Delta		700	2,500			1,600		2,600				157,200	6,300	5,100		
		North Delta		8,900	500		8,200	82		10,900				191,400	8,900	8,400		
		Total	10,000	33,600	7,400		15,400	2,800		19,900					564,700	27,600	44,000	
Bay	Suisun Marsh And S.F. Bay	Suisun Bay	26,400	2,300	500	200	59,800			79,500		32,300	13,600	13,800	10,900	33,800		
		Napa River	12,300	21	600	2,300		18,500	32,100		102,700		41,800	18,000	7,300	31,200		
		Petaluma River		1,300		6,000		8,800			13,000		2,500	53,200		9,600		
		San Pablo Bay	54	2,300		46					7			36		300		
		Sonoma Creek	400			400					1,700	25	21,400	27,100	39,900		15,600	
		Total	39,100	6,000	1,000	9,000	59,800		108,500	32,100	169,400	85,000	125,000	18,200	90,500			
		Sacramento River	Sacramento River	Sacramento River		1,500	85		700	32,200		1,200		8,000		140,500	42,200	8,500
American River Basin	American Basin					100		300	500		19,600		3,100		187,900		63,200	
Morrison Creek Watershed				9	700		400	2,400		62,400		5,000	58	24,300	900	89,500		
Butte Basin	Antelope Creek					300			5		23,600	3,100	126,000	45,600	8,800	5,000	300	
	Butte Creek					500		300			16,300	5,800	30,500	88,100		32	10,400	
	Butte Sink					46		19,100	1,400		33,000		17,600	1,000	214,700	21,500	1,800	
	Deer Creek							300	1,500		3,700	5,500	13,400	117,500	4,500	400		
	Mill Creek							800		10	13,400	7,200	56,600	50,100	5,300	200	2,700	
	Paynes Creek								1,400		1,600	3,700	38,400	6,000			1,000	
	Pine, Rock, & Big Chico Creeks							5			47,100	6,200	85,600	59,200	26,600	15,600	11,300	
Colusa Basin	Elder Creek								85		56,400		114,800		40,900	200	2,600	
	South Colusa Basin				200	200		31,300			95,900		102,500		541,500	25,900	3,100	
	Stony Creek					47				100	13,000		1,900		48,200	4,000	4,000	
	Thomes Creek				1,700	100				81	59,000		33,000		89,800	1,100	2,700	
Cottonwood Creek Basin	Lower Cottonwood Creek								2		2,500	1,300	158,200				20	
	Upper Cottonwood Creek										27,000	91,400	181,300	141,100			1,000	
Feather River/Sutter Basin	Bear River					73		300	900		20,700		500		67,000	11,900	5,700	
	Feather River				1,300	3,000		700	10,800		7,300		300		36,100	29,100	5,600	
	Honcut Creek							300	1,700		20,000		32,500	60,200	50,300	7,000	6,800	
	Sutter Basin							2,300	600		13,500		12,500		167,000	29,400	4,600	
	Yuba River					1,500					25,700		37,300	74,600	11,200	1,000	11,100	
North Sacramento Valley Basin	Bear Creek							600			4,700		57,600	34,500		800		
	Battle Creek							1,800	1,700		1,600	1,000	106,400	157,800			5,900	
	Clear Creek					8			200		6,900		155,800	2,300	4,300		34,000	
	Cow Creek							300	3,900		9,200	3,900	112,700	119,700	900			
	North Sacramento Valley												700				15	
Yolo Basin	Cache Creek				200			6			5,500		12,400		45,100	9,800	6,500	
	Putah Creek					17		100	98		5,600		5,600	98	62,300	9,400	4,700	
	Willow Slough					600		300			5,100		6,100		99,800	12,000	1,800	
	Solano					200		100	300		64,500		3,500	300	78,700	10,200	5,700	
	Total			5,000	7,500		60,000	59,800		660,200	129,100	1,520,000	958,200	1,956,500	236,800	294,400		
San Joaquin River	San Joaquin River			San Joaquin River	100	400		2,300	8,500		20,000	46	42		110,800	15,000	4,400	
				East San Joaquin Basin	Chowchilla/Fresno Rivers		1,200		7,400	1,600		230,600	1,500	2,500		470,000	98,800	29,500
				East San Joaquin Basin	Merced River		300		700	1,100		84,600		25,200		133,100	68,600	6,100
		Stanislaus River				200	3,200		26,300		14,500		36,000	60,800	9,100			
		Tuolumne River		200	4,100		300	200		96,200		36,000		156,600	87,200	40,000		
		East Side Delta Tributaries	Consumnes River		2,100		400	3,600	500	183,700	32,400	177,100	284,400	115,400	6,000	12,300		
		Eastside Delta Lowlands Fan			6,500		100	1,800		170,200	8,300	82,500		213,100	109,200	35,900		
		West San Joaquin Basin	Lower West San Joaquin Basin		3,100		7,100	200		164,300	33,000	42		429,200	29,300	4,800		
		Upper West San Joaquin Basin			13,600			1,000		355,600	77,700	262,400	1,700	24,700	3,100	4,900		
		Total	300	31,300		18,500	21,100	500	1,335,600	152,900	600,200	286,200	1,689,600	477,800	146,900			

Notes:

- (1) Includes tidal freshwater emergent and non-tidal freshwater emergent
- (2) Includes upland cropland and seasonally flooded agricultural land
- (3) Not NCCP habitat

at conserving the quality and quantity of natural habitats. Where CALFED Program actions would result in the permanent loss of natural NCCP habitats, restoration, enhancement, or protection of in-kind habitat would typically be required to compensate for the loss of habitat. Conservation measures for upland cropland and seasonally flooded agriculture habitats are not intended to conserve agricultural land uses, but are directed at avoiding impacts on agricultural lands that provide high wildlife habitat values or replacing the wildlife habitat values provided by agricultural lands (e.g., the abundance or availability of forage for species that use agricultural habitats).

Conservation measures developed for each NCCP habitat identify a menu of options to avoid, minimize, or compensate for CALFED Program impacts on that habitat. Some conservation measures presented in Attachment 4: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures, may be less appropriate or more appropriate than others for addressing a specific type or level of impact on an NCCP community resulting from a CALFED Program action. Also, some conservation measures may not need to be implemented if the type, location, timing, and success of implementing some CALFED Program actions (primarily ERP actions) result in compensating for Program impacts. For example, if implementing an ERP action results in the loss of wetland habitat area, but other ERP actions have been implemented that have restored sufficient wetland habitat area to compensate for the loss of wetland habitat, implementation of conservation measures may not be required. Where CALFED Program actions (primarily non-ERP actions) result in a loss of habitat, compensatory conservation measures must be implemented and the compensatory habitat clearly identified.

5.2.2 Conservation Measures for Evaluated Species

Conservation measures that avoid, minimize, and compensate for direct and indirect impacts apply to all evaluated species, regardless of the species goal (i.e., "m", "r", or "R"). For species that are extremely rare, a conservation measure is included that requires avoiding implementation of Program actions that would result in direct mortality of individuals. Species with this conservation measure are listed in Table 5-5, which includes species whose populations are especially rare or localized such that loss of individuals of these species could substantially diminish species viability. Conservation measures to avoid, minimize, and compensate for impacts on NCCP habitats (see Attachment 5: Prescriptions and Conservation Measures for Species) also serve to compensate for impacts on evaluated species that are associated with affected NCCP habitats. As with conservation measures for NCCP communities, conservation measures that address Program impacts on evaluated species represent a menu of options to avoid, minimize, or compensate for CALFED

Table 5-5: Evaluated Species for which Direct Mortality as a Result of Implementing CALFED Actions is Prohibited as a Condition of the MSCS

MSCS User Guide: This table identifies species for which the MSCS requires as a conservation measure the avoidance of all actions that could result in direct mortality. This conservation measure was identified because of the extreme rarity or endangerment of these species. For many of the plants identified, fewer than a dozen known populations exist.

Common Name	Scientific Name
California condor	<i>Gymnogyps californianus</i>
California freshwater shrimp	<i>Syncaris pacifica</i>
Calippe silverspot butterfly	<i>Speyeria callippe callippe</i>
Lange's metalmark	<i>Apodemia mormo langei</i>
Riparian brush rabbit	<i>Sylvilagus bachmani riparius</i>
Tree-anemone	<i>Carpenteria californica</i>
Sharsmith's onion	<i>Allium sharsmithae</i>
Klamath manzanita	<i>Arctostaphylos klamathensis</i>
Persistent-fruited saltscale	<i>Atriplex persistens</i>
Shasta clarkia	<i>Clarkia borealis</i>
Beaked clarkia	<i>Clarkia rostrata</i>
Silky criptantha	<i>Cryptantha crinit</i>
Hall's tarplant	<i>Hemizonia halliana</i>
Pale-yellow layia	<i>Layia heterotricha</i>
Bellinger's meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>Bellingeriana</i>
Mt. Tedoc linanthus	<i>Linanthus nuttallii</i>
Shasta snow-wreath	<i>Neviusia cliftonii</i>
Thread-leaved beardtongue	<i>Penstemon filiformis</i>
Mt. Diablo phacelia	<i>Phacelia phacelioides</i>
Ione buckwheat	<i>Eriogonum apricum</i> var. <i>apricum</i>
Ione manzanita	<i>Arctostaphylos myrtifolia</i>
Irish Hill buckwheat	<i>Eriogonum apricum</i> var. <i>prostratum</i>
Parry's horkelia	<i>Horkelia parryi</i>
Stebbins' morning-glory	<i>Calystegia stebbinsii</i>
Pine Hill ceanothus	<i>Ceanothus roderickii</i>
Pine Hill flannelbush	<i>Fremontodendron californicum</i> ssp. <i>decumbens</i>
El Dorado bedstraw	<i>Galium californicum</i> ssp. <i>sierrae</i>
Layne's ragwort	<i>Senecio layneae</i>
Clara Hunt's milk-vetch	<i>Astragalus clarianus</i>
Large-flowered fiddleneck	<i>Amsinkia grandiflora</i>
Red-flowered lotus	<i>Lotus rubriflorus</i>
California seablite	<i>Suaeda californica</i>
Lesser saltscale	<i>Atriplex minuscula</i>
Ferris's milk-vetch	<i>Astragalus tener</i> var. <i>ferrisiae</i>

Table 5-5: Evaluated Species for which Direct Mortality as a Result of Implementing CALFED Actions is Prohibited as a Condition of the MSCS (continued)

Common Name	Scientific Name
Sonoma sunshine	<i>Blennosperma bakeri</i>
Loch Lomond button-celery	<i>Eryngium constancei</i>
Ahart's dwarf rush	<i>Juncus leiospermus</i> var. <i>ahartii</i>
Contra Costa goldfields	<i>Lasthenia conjugens</i>
Butte County meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>californica</i>
Sebastopol meadowfoam	<i>Limnanthes vinculans</i>
Few-flowered navarretia	<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i>
Many-flowered navarretia	<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>
Pincushion navarretia	<i>Navarretia myersii</i>
Colusa grass	<i>Neostaphia colusana</i>
San Joaquin Valley Orcutt grass	<i>Orcuttia inaequalis</i>
Hairy Orcutt grass	<i>Orcuttia pilosa</i>
Sacramento Orcutt grass	<i>Orcuttia viscida</i>
North Coast semaphore grass	<i>Pleuropogon hooverianus</i>
Green's tuctoria	<i>Tuctoria greenei</i>

5: Effects of CALFED Actions and Conservation Measures

Program impacts on evaluated species. Some of the conservation measures presented in Attachment 5: MSCS Conservation Measures for Evaluated Species may be less appropriate or more appropriate than others for addressing a specific type or level of impact on an evaluated species.

The additional conservation measures designed to ensure the Program meets the species conservation goals would achieve the prescriptions when implemented in combination with conservation measures to avoid, minimize, and compensate for Program impacts. These additional conservation measures represent the range of actions that may be required to ensure that prescriptions (i.e., species habitat or population targets that, if met, achieve species goals) for species with a “R” or “r” goal are achieved. The need to implement a particular conservation measure for achieving “R” and “r” species goals will in most, if not all instances, depend on the response of “R” and “r” species populations to ERP and other Program actions as they are implemented. For example, if implementation of ERP actions to restore and enhance saline emergent wetlands results in achieving the prescription for the Suisun song sparrow, additional MSCS conservation measures to achieve its “R” goal would not need to be implemented.

Conservation Measures for Species with “R” and “r” Goals: General categories of species conservation measures for species with “R” or “r” goals are described below. These species conservation measures address compensation for adverse effects and enhancement for species recovery. Specific conservation measures for each evaluated species with “R” or “r” goals are presented in Attachment 5: MSCS Conservation Measures for Evaluated Species. The applicability of each general category described below to a particular species is primarily dependent on the current status and distribution of a species, its ecological requirements, and the types of actions that would be necessary to achieve its recovery goal prescription.

General categories of conservation measures to avoid, minimize or compensate for CALFED Program impacts include those that:

1. require surveys to be conducted in suitable habitat areas to determine the presence and distribution of species before implementing actions that could result in the loss or degradation of occupied habitat;
2. consistent with achieving CALFED Program objectives, manage lands purchased or acquired under conservation easements that are occupied by evaluated species to maintain or increase population levels;
3. avoid implementing actions, including construction, operation, land management, and incidental use, that could result in disturbance to evaluated species during sensitive periods (e.g., nesting periods);
4. consistent with achieving CALFED Program objectives, operate structures that control patterns of flow through the Delta in a manner to avoid or reduce adverse effects on evaluated species;

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5. require compliance with applicable measures identified in existing USFWS biological opinions issued for evaluated species; and
6. consistent with achieving CALFED Program objectives, maintain specific flows in Bay-Delta tributaries and through the Delta during certain periods that are important to maintaining desirable habitat conditions for evaluated fish species.

General categories of conservation measures designed to achieve species conservation goals, many of which add detail to existing Program actions (e.g., where or how a beneficial Program action should be implemented to achieve a species goal), include those that:

1. coordinate CALFED Program actions and conservation measures to achieve species goals with other federal and State programs (e.g., the Senate Bill (SB)1086 program, the U.S. Army Corps of Engineers' Sacramento and San Joaquin Basin Comprehensive Study, the San Francisco Bay Ecosystem Goals Project, and USFWS species recovery plans) that could affect management of species habitat to avoid potential conflicts among management objectives and to achieve multiple management objectives;
2. identify priorities for implementing ERP habitat protection, enhancement, and restoration actions to best accomplish species goals;
3. identify and implement specific habitat enhancement or restoration design requirements necessary to achieve species goals;
4. identify and implement appropriate and specific management actions necessary to protect and increase species populations (e.g., predator control or control of invasive non-native plants);
5. consistent with achieving CALFED Program objectives, remove or modify barriers to fish movement to improve access of evaluated fish species to important habitat areas;
6. identify and implement appropriate actions necessary to improve water quality to benefit evaluated aquatic species; and
7. require implementation of monitoring to determine the success of species recovery actions in achieving species goals and to determine if, through the adaptive management process, conservation measures should be modified to better ensure that species conservation goals are met.

Conservation Measures for Species with an “m” Goal: General categories of conservation measures for species with an “m” goal are described below. These species conservation measures address avoidance, minimization, and compensation for adverse effects. Specific conservation measures for species with an “m” goal are presented in Attachment 5: MSCS Conservation Measures for Evaluated Species. The applicability of each general category described below to a particular species is primarily dependent on the current status and distribution of a species, its ecological requirements, and the types of actions that would be necessary to achieve the “m” goal. General categories of conservation measures for species with an “m” goal are those that:

1. require coordinating CALFED Program actions with existing recovery plans to avoid potential conflicts with actions to recover species;

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2. require surveys to determine the presence, distribution, and importance of habitat use areas to be conducted in suitable habitat areas within the portions of species ranges that could be affected by CALFED Program actions before implementing actions that could result in the loss or degradation of occupied habitat;
3. avoid the implementation of CALFED Program actions that could result in the substantial loss or degradation of suitable habitat in areas that support core populations that are essential to maintaining the viability and distribution of the species;
4. require, depending on the relative importance of habitat areas occupied by evaluated species, the 1) acquisition, protection, and management of existing occupied habitat areas or require the 2) enhancement or restoration of sufficient suitable habitat to adequately replace the values associated with occupied habitat affected by CALFED Program actions;
5. consistent with achieving CALFED Program objectives, manage lands purchased or acquired under conservation easements that are occupied by evaluated species to maintain or increase populations;
6. consistent with ERP objectives, priorities for the acquisition of lands or conservation easements should be directed towards lands that support important populations of or are important habitat use areas for evaluated species;
7. consistent with ERP objectives, restore natural habitats adjacent to occupied habitats to create a buffer of natural habitat that protects populations of evaluated species from adverse affects of future land use changes and to provide suitable habitat for the natural expansion of populations;
8. require compliance with standardized USFWS, NMFS, and CDFG species mitigation/compensation guidelines when implementing CALFED Program actions within occupied habitat for which guidelines have been developed;
9. require, where appropriate, the capture of individuals from occupied habitat that would be adversely affected by the CALFED Program and relocation of captured individuals to nearby suitable existing, restored, or enhanced habitat;
10. require, where appropriate, collection of seed or other propagules from evaluated plant species that would be adversely affected by implementation of CALFED Program actions and use the collected material for inoculating unoccupied suitable habitat;
11. require that CALFED Program actions that potentially could mobilize large quantities of toxic materials from the soil include an analysis to determine the amount of contaminants that could be mobilized and, if released contaminant loadings could be harmful, modify proposed actions, to the extent consistent with achieving CALFED objectives, to reduce loadings of mobilized contaminants;
12. avoid construction, recreation, or other types of activities associated with implementing CALFED Program actions, operating facilities, or managing lands that could result in disturbance to evaluated species during sensitive periods (e.g., nesting periods);
13. avoid implementing CALFED Program actions that could result in the harm or mortality to individuals or viability of evaluated species' populations;
14. require, where appropriate, monitoring of sites managed under the CALFED Program that are occupied by evaluated species, especially following management activities, and modify management as needed to maintain or increase current population levels using adaptive management; and
15. require, where appropriate, research to obtain information regarding the ecological requirements of evaluated species necessary to ensure that species will be adequately conserved.

5.2.3 Conservation Measure Studies and Surveys

The conservation measures include species-specific research which would be implemented as part of CMARP and/or the ERP. For species that are not well-studied, research and surveys are needed to better understand species ecological requirements, restoration needs, abundance and distribution, effects of Program actions, and to design adaptive management programs. The research listed as Conservation Measures is not the complete list of species-related studies CALFED intends to undertake; the CMARP also lists numerous studies, primarily for fish, that would be conducted to obtain greater understanding of species recovery requirements.

Not all research listed in the MSCS will be necessary to restore species. For some species, studies proposed in the MSCS are essential for developing appropriate restoration actions needed to meet species goals. For other species, ERP restoration actions would provide the anticipated benefits to the species, and species-specific studies would be necessary only if restoration actions do not improve the species' status and distribution as expected. Section 7.4 of this document discusses how conservation measures, including those listed in this section, would be implemented through Action-Specific Implementation Plans.

Although some research measures are termed essential for meeting species goals, this does not mean that the measures would be implemented in Stage 1 of the Program. Priorities for implementation of research conservation measures will depend largely upon species and ecosystem restoration needs relative to the Program as a whole. For some species, research may be conducted in later stages of the Program.

CALFED proposes a two-category classification of the Conservation Measure studies and surveys, Essential and Conditional. The Conservation Measures associated with each category are listed below.

Draft Conservation Strategy Research Measures

1. Essential research needed to achieve recovery goals.

Soft Bird's-Beak (R) Research the habitat requirements and reasons for rarity. Determine microhabitat requirements, including salinity and other habitat management needs.

Suisun Thistle (R) Research the habitat requirements and reasons for rarity. Determine microhabitat requirements, including other habitat management needs. Design and implement habitat enhancement and management measures.

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Lange's Metalmark (R) Conduct research to identify appropriate methods for propagating the Lange's metalmark butterfly's host plant, a subspecies of the naked buckwheat (*Eriogonum nudum* var. *auriculatum*), and establish plant populations in enhanced and restored habitat.

Antioch Dunes Evening-Primrose (R) Conduct research to identify appropriate methods for propagation and establish species populations in enhanced and restored habitat.

Green Sturgeon (R) Continue to conduct research to determine ecological needs, primarily focused on addressing appropriate harvest levels, and operations of upstream migration barriers such as Red Bluff Diversion Dam.

Central Valley Fall-Run Chinook Salmon (R) Conduct research to identify methods for censusing populations and to determine the distribution of spawning fish in Central Valley streams.

Riparian Brush Rabbit (r) Coordinate with California Department of Parks and Recreation to develop and implement an emergency plan and monitoring system to provide swift action to save individuals and habitat at Caswell Memorial State Park in the event of flooding, wildfire, or a disease epidemic.

Riparian Brush Rabbit (r) Conduct research to identify appropriate methods for implementing a captive breeding program; capturing and handling individuals from wild populations; and reintroducing individuals to establish new populations within its historic range in suitable existing or restored habitat areas.

San Joaquin Valley Woodrat (r) Conduct surveys to map suitable habitat and locate woodrat populations along portions of the San Joaquin River and its major tributaries within the historic range.

San Joaquin Valley Woodrat (r) Conduct research to identify appropriate methods for implementing a captive breeding program; capturing and handling individuals from wild populations; and reintroducing individuals to establish new populations within its historic range in suitable existing or restored habitat areas.

Giant Garter Snake (r) Conduct surveys to locate species populations and determine distribution in the Delta Region to assist in identifying additional appropriate actions that should be implemented to contribute to recovering Delta populations.

Giant Garter Snake (r) Research the feasibility of reintroducing the giant garter snake into suitable unoccupied existing and restored habitats in the Delta, Sacramento River, and San Joaquin River Regions.

Giant Garter Snake (r) Conduct research to better determine ecological requirements of the giant garter snake.

Delta Green Ground Beetle (r) Survey suitable habitat, including large pools associated with pescadero soils, to establish the current species range.

Delta Green Ground Beetle (r) Conduct research to develop a greater understanding of the species' life history, including larval requirements and prey species ecology (especially springtail). Use results to develop habitat requirements and management prescriptions to promote and ensure population viability.

Delta Green Ground Beetle (r) Conduct research to identify appropriate methods for reintroduction to establish new populations within the species' historic range.

Alkali Milkvetch (r) Conduct inventory and surveys to determine species status and distribution in order to define restoration needs.

2. Conditional research projects - implemented if restoration efforts do not produce expected benefits.

Suisun Thistle (R) Study vulnerability to hybridization with non-native *Cirsium* species, and design and implement non-native *Cirsium* control measures when hybridization is likely to occur.

Suisun Thistle (R) Study vulnerability to agents for biological control of non-native thistles and design and implement actions to reduce the effects of biological control agents when biological control effects are likely.

Suisun Ornate Shrew (R) Conduct research to better determine the ecological requirements for use in designing and managing restored and enhanced habitat areas.

Valley Elderberry Longhorn Beetle (R) Conduct research to determine dispersal distance from occupied habitat to suitable unoccupied habitat.

Delta Smelt (R) Conduct research to determine appropriate methods for rearing delta smelt in captivity and evaluate the need to acquire rearing facilities in the event delta smelt populations continue to decline following implementation of restoration actions.

Mason's Lilacopsis (R) Conduct research into the extent and physical and biological qualities of existing habitat and populations prior to levee or restoration actions

Salt Marsh Harvest Mouse (r) Conduct research to better determine the ecological requirements for use in designing and managing restored and enhanced habitat areas to benefit the species.

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Salt Marsh Harvest Mouse (r) Identify and implement feasible methods for controlling invasive non-native marsh plants and reintroducing SMHM into unoccupied suitable enhanced habitats and restored habitat areas.

San Pablo California Vole (r) Conduct research to identify feasible methods for controlling invasive non-native marsh plants and reintroducing San Pablo California voles into unoccupied suitable enhanced habitats and restored habitat areas.

Northern California Black Walnut (r) Research species ecology (e.g., dispersal mechanisms, utilization by other species) to formulate restoration, protection, and management strategies for contributing to recovery.

Bristly Sedge (r) Research habitat requirements and potential conservation measures. Design and implement conservation measures based on results of research.

Delta Coyote-Thistle (r) Research the species' ecology to formulate strategies for recovery.

Alkali Milkvetch (r) Research reintroduction techniques and apply the results to reintroduction of populations to portions of the historic range where the plant is extirpated.

Sacramento Perch (r) Conduct research to determine appropriate methods for rearing Sacramento perch in captivity and evaluate the need to acquire rearing facilities to provide fish for introductions in the event Sacramento perch populations continue to decline following implementation of restoration actions.

Sacramento Perch (r) Conduct research to determine methods for reestablishing populations in habitats not populated by non- native predators and to identify suitable locations for establishing additional populations.

Delta Mudwort (r) Research the extent and physical and biological qualities of existing habitat and populations prior to levee or restoration actions.

5.3 Summary of Effects on NCCP Communities

Potential beneficial and adverse impacts on NCCP communities are presented by summary outcome in Attachment 4: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures. Table 5-6 presents a summary of the effects on NCCP communities resulting from implementation of the CALFED Program, including conservation measures. The findings in Table 5-6 assume: 1) that the entire CALFED Program is implemented, including conservation measures presented in this MSCS, and 2) that the Program's water management strategy is structured in a way that promotes recovery of fish species. The adverse effects associated with partial Program

Table 5-6: Summary Effect of Implementing CALFED Actions and Conservation Measures on NCCP Communities

MSCS User Guide: This table presents the expected summary effect of implementing all Program actions with MSCS conservation measures to compensate for Program impacts on NCCP habitats and fish groups throughout the MSCS focus area. The summary effect of implementing the Program on NCCP habitats and fish groups is determined from the analysis of potential effects of implementing summary outcomes on NCCP habitats and fish groups presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities.

Community	Summary Effect
Tidal perennial aquatic	Restoration of up to 8,500 acres of shallow tidal perennial aquatic habitat in the Delta and Bay regions, and potential for restoration or enhancement of tidal perennial aquatic habitat in the Delta and Bay regions incidental to restoration of flows, floodplains, and tidal slough habitats. Potential for short-term loss or degradation of existing habitat area and potential for long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts.
Valley riverine aquatic	Potential for substantial increases in shaded riverine aquatic and instream habitats and improved stream temperatures along the Sacramento and San Joaquin rivers and their tributaries, and North Bay tributaries as a result of enhancing or restoring riparian habitat along up to 235 miles of stream channels; restoration of floodplain and channel meander processes along major tributaries in the Sacramento River and San Joaquin River Regions; and improvement in passage of anadromous fish to and from habitat areas. Potential for permanent fragmentation of valley riverine aquatic habitat corridors if new reservoirs are constructed in existing habitat areas.
Montane riverine aquatic	Potential for increase in shaded riverine aquatic and instream habitats and improved stream temperatures along Sacramento and San Joaquin rivers and North Bay tributaries, and improvement in passage of anadromous fish to and from habitat areas. Potential for permanent fragmentation of montane riverine aquatic habitat corridors if new reservoirs are constructed in existing habitat areas.
Lacustrine	Restoration of up to 1,600 acres of lacustrine habitat adjacent to existing and restored wetlands in the Bay Region and, potential for substantial increases in lacustrine habitat area associated with construction of reservoirs, and for restoration or enhancement of lacustrine habitat in all Regions incidental to restoration and enhancement of wetlands, agricultural habitats, and floodplains. Potential for loss or degradation of existing habitat areas, such as stock ponds, in some locations.
Saline emergent	Protection and enhancement of 6,200 acres of existing and restoration of 7,500-12,000 acres of tidal saline emergent habitat area in the Bay Region. Potential short-term loss of tidal and nontidal habitat area from implementation of Program actions and long-term increase in habitat area resulting from implementation of conservation measures to compensate for Program impacts.
Tidal freshwater emergent	Increase in 30,000-45,000 acres of tidal freshwater emergent habitat area in the Delta Region as a result of restoration, long-term protection of existing habitat areas associated with channel islands, and enhancement of habitat resulting from control of non-native aquatic plants. Potential short-term loss of habitat area from implementation of Program actions and long-term increase in habitat area resulting from implementation of conservation measures to compensate for Program impacts.
Nontidal freshwater permanent emergent	Restoration of up to 19,600 acres of nontidal freshwater permanent emergent wetlands in the Delta Region and potential for restoration or enhancement of emergent wetlands in all Regions incidental to restoration and enhancement of seasonal wetland habitats and floodplains. Potential for short-term loss or degradation of existing wetland habitats and long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts.

Table 5-6: Summary Effect of Implementing CALFED Actions and Conservation Measures on NCCP Communities (continued)

Community	Summary Effect
Natural seasonal wetlands	Potential for protection, enhancement, and/or restoration of 600 to 1,100 acres of vernal pools and associated watershed in the Bay Region , and potential for protection or enhancement of existing and creation of additional seasonal wetlands incidental to implementing other Program actions. Potential for short-term loss or degradation of existing natural seasonal wetland habitats and long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts.
Managed seasonal wetlands	Potential for an increase of up to 29,500 acres of managed seasonal wetland in the Delta and Bay Regions and increase in habitat values provided for wildlife on up to approximately 300,125 acres of existing managed seasonal wetlands in all regions, and potential increase in habitat area incidental to restoration and enhancement of other wetland habitats. Potential for short-term loss or degradation of existing managed seasonal wetland habitats and long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts.
Valley/foothill riparian	Restoration of up to 235 miles of riparian habitat along river and stream channels in the Delta, Bay, and San Joaquin River Regions , protection and enhancement of up to 14,500 acres of riparian habitation the Delta, Sacramento River, and San Joaquin River Regions, , and enhancement of existing riparian habitats throughout the focus area by reducing populations of invasive non-native plants. An unknown quantity of riparian habitat would also be expected to naturally establish in association with restoration or enhancement of tidal sloughs and channel islands in the Delta and restoration or enhancement of wetlands throughout the focus area. Potential for short-term loss or degradation of existing habitat area and potential for long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts, and potential for permanent fragmentation of valley/foothill riparian corridors if new surface storage facilities are constructed in existing habitat areas.
Montane riparian	Potential for increase in and greater connectivity among montane riparian habitat areas along tributaries to the Sacramento and San Joaquin rivers and North Bay tributaries. Potential for short-term loss or degradation of existing habitat area and potential for long-term increase in habitat area with implementation of conservation measures to compensate for Program impacts and potential for permanent fragmentation of montane riparian corridors if new surface storage facilities are constructed in existing habitat areas.
Grassland	Potential for an increase of up to 11,000 acres of perennial grassland in the Delta and Bay regions and increase in and/or enhancement of habitat area associated with restoration and enhancement of seasonal wetlands. An overall reduction in the area annual grassland is expected in some locations (primarily in the Sacramento River and San Joaquin River Regions) as a result of restoring channel, wetland, and riparian habitats, construction of conveyance, storage, and other facilities or structures necessary to achieve Program objectives.
Inland dune scrub	Increase in inland dune scrub habitat area of 50-100 acres within and adjacent to the Antioch Dunes Ecological Reserve, enhancement and increased level of protection of existing habitat area within the Antioch Dunes Ecological Reserve, and potential increases in populations of evaluated species present at the Antioch Dunes Ecological Reserve.
Upland scrub	Potential for permanent loss of habitat area with construction of new or enlarged storage reservoirs and associated facilities.

Table 5-6: Summary Effect of Implementing CALFED Actions and Conservation Measures on NCCP Communities (continued)

Community	Summary Effect
Valley\foothill woodland and forest	Potential for increase in habitat area near affected channels in the Sacramento River and San Joaquin River Region as a result of restoring floodplains. Potential for short-term loss of habitat area with construction of new or enlarged storage reservoirs and associated facilities and long-term increase in and/or enhancement of habitat area with implementation of conservation measures to compensate for Program impacts.
Montane woodland and forest	Potential for short-term loss of habitat area with construction of new or enlarged storage reservoirs and associated facilities and long-term increase in and/or enhancement of habitat area with implementation of conservation measures to compensate for Program impacts .
Upland cropland	Potential for substantial losses of upland croplands with high wildlife foraging habitat value for associated species (primarily in the Delta Region) as a result of implementing Program actions. Overall forage availability for species that use upland cropland habitats, however, would potentially be substantially increased with the restoration or enhancement of natural foraging habitat areas, management of up to approximately 389,000 acres of agricultural lands to improve wildlife habitat values, and implementation of conservation measures to compensate for Program impacts on evaluated species.
Seasonally flooded agriculture	Potential for substantial losses of seasonally flooded agricultural lands with high wildlife foraging habitat value for associated species (primarily in the Delta Region) as a result of implementing Program actions. Overall forage availability for species that use upland cropland habitats, however, would potentially be substantially increased with the restoration or enhancement of natural foraging habitat areas, management of up to approximately 389,000 acres of agricultural lands to improve wildlife habitat values, and implementation of conservation measures to compensate for Program impacts on evaluated species.
Anadromous fish species	The proposed actions and associated conservation measures of the CALFED Program would lead to substantial improvement in anadromous fish populations and their habitat.
Estuarine fish species	The proposed actions and associated conservation measures of the CALFED Bay-Delta Program would lead to substantial improvement in evaluated estuarine fish populations and their habitat.

5: Effects of CALFED Actions and Conservation Measures

implementation or an unsuccessful Environmental Water Account (EWA) will result in deviations from the summary of effects presented in Table 5-6 for the NCCP fish groups and some NCCP habitats. The EWA is an important feature of the water management strategy that can simultaneously meet fish protection, water quality, and water supply goals. Failure to develop and implement an EWA would likely lead to substantial changes in the summary effects for fish groups presented here.

The extent and type of NCCP habitats that could be affected by implementation of Program actions are not assessed because actions that could result in the loss of existing habitat are programmatic and generally do not specify where the action would be implemented. Specific impacts on existing habitats will be assessed in ASIPs when specific actions are proposed for implementation.

Generally, implementation of CALFED Program actions would result in conversion of existing natural (non-agricultural) habitat types to other natural habitat types. For example, nontidal freshwater permanent emergent wetlands present on Delta islands could be converted to tidal freshwater emergent wetland as a result of setting back or breaching Delta levees. There could also be a loss of natural habitat, for example, during construction of conveyance facilities, roads, or other infrastructure. Implementation of CALFED Program actions and conservation measures that compensate for habitat loss, however, would result in increases in the extent or quality of most natural NCCP habitats. Some overall loss of grassland and upland scrub habitats could result from conversion of these habitat types to other natural habitats or to other uses.

Implementation of proposed Program actions would also result in conversion of a substantial amount of agricultural lands (primarily in the Delta region) to natural habitat or to other uses (e.g., conveyance and storage facilities). The habitat values for evaluated species provided by affected agricultural lands, however, would be replaced or increased as a result of restoration and enhancement of natural NCCP habitats, changing cropping patterns or agricultural land use practices to enhance wildlife habitat values provided on other agricultural lands, or implementation of conservation measures to compensate for loss of habitat values. Conservation measures in the MSCS are not anticipated to result in the loss of agricultural lands beyond what is described in the PEIS/EIR.

5.3.1 Estimated Change in NCCP Habitats with Implementation of the ERP in the Delta Region

Because GIS coverage of the area of habitat types is complete for the Delta Region, an analysis of the expected change in NCCP habitat area from existing

conditions with implementation of the ERP can be conducted. The ERP provides specific restoration target acreages for several NCCP habitats, although the amount of the NCCP habitats that will be restored cannot be estimated for many of the actions. For example, restoration of the ERP Delta slough habitat type could include restoration of varying amounts of tidal perennial aquatic, valley/foothill riparian, tidal freshwater emergent, and saline emergent NCCP habitats (Table 5-7). Table 5-8 compares the existing extent of NCCP habitats to the future extent of NCCP habitat in the Delta Region with full implementation of ERP habitat restoration actions for four habitat types: aquatic (includes tidal perennial aquatic and lacustrine NCCP habitats), seasonal wetland (includes managed and natural seasonal wetland NCCP habitats), freshwater permanent emergent wetland (includes tidal freshwater emergent and nontidal freshwater permanent emergent NCCP habitats) and valley/foothill riparian habitat. Implementation of ERP habitat restoration actions could increase the total area of these four habitats by 222% to 243% in the Delta Region. Table 5-8 does not present additional habitat acreage that would also be restored as a result of implementing other ERP actions (e.g., restoration of up to 190 miles of Delta slough habitat).

5.4 Summary of Effects on Evaluated Species

The analysis of potential overall effects on evaluated species was conducted for the CALFED Program actions used to develop the summary outcomes in Table 5-1, along with implementation of conservation measures that would avoid, minimize, or compensate for potential adverse effects of those actions. Potential beneficial and adverse impacts on NCCP habitats with which evaluated species are associated are presented by summary outcome in Attachment 4: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures. The overall expected effect of implementing the Program on NCCP habitats with which species are associated are presented in Table 5-6 (refer to Attachment 3: Evaluated Species Associated with NCCP Habitats or Attachment 4: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures, to identify the NCCP habitat with which each species is associated).

Implementation of CALFED Program actions associated with each summary outcome would have beneficial, adverse, or no effects on an evaluated species. Implementing an action could affect evaluated species in three ways by: 1) directly resulting in the take of individuals; and/or 2) degrading or improving the quality of habitat with which the species is associated; and/or 3) decreasing or increasing the quantity of habitat with which the species is associated. Evaluated species that are expected to benefit from implementation of the ERP are presented in Table 5-9.

Table 5-7: Summary of Numerical Ecosystem Restoration Program Habitat Restoration and Enhancement Targets

NCCP Habitat Type	Applicable CALFED Regions ¹				Restored ³	Total ²	
	D	B	SR	SJR		Enhanced ³	Total Habitat Treated
Tidal perennial aquatic	X	X			8,500 ac 120-260 miles ⁴	0	8,500 ac 120-260 miles ⁴
Saline emergent		X			7,500-12,000 ac 35-70 miles ⁴	6,200 ac	13,700-18,200 ac 35-70 miles ⁴
Tidal freshwater emergent	X				30,200-45,800 ac ⁵ 85-190 miles ⁴	0	30,200-45,800 ac ⁵ 85-190 miles ⁴
Nontidal freshwater permanent emergent	X				19,600 ac ⁶	0	19,600 ac
Lacustrine		X			1,600 ac	0	1,600 ac
Managed seasonal wetland	X	X	X	X	29,000-29,500 ac	290,125-300,125 ac	319,125-329,625 ac
Natural seasonal wetlands		X			0	100 ac	100 ac
Valley/foothill riparian and montane riparian	X	X	X	X	4,920-5,520 ac ⁵ 173-235 miles 120-260 miles ⁴	10,500-14,500 ac	15,420-20,020 ac ⁵ 173-235 miles 120-260 miles ⁴
Grassland	X	X	X		9,000-11,000 A	4,900-5,400 ac ⁷	13,900-16,400
Inland dune scrub	X				0	50-100 ac	50-100 ac
Seasonally flooded agriculture and upland cropland	X		X	X	0	353,933-388,933 ac	353,933-388,933 ac

¹ D = Delta Region B = Bay Region SR = Sacramento River Region SJR = San Joaquin River Region

² ac = acres of habitat to be enhanced or restored; miles = miles of habitat to be enhanced or restored along stream channels and sloughs.

³ Restored habitat will create new habitat area, resulting in an increase in the extent of habitat. Enhanced habitat will not result in an increase in total habitat area.

⁴ Length of restored tidal sloughs. A portion of restored tidal sloughs could result in restoration of tidal perennial aquatic habitat in the Delta and Bay Regions, saline emergent habitat in the Bay Region, and tidal freshwater emergent, and valley/foothill riparian habitats in the Delta Region.

⁵ Includes restoration or enhancement of 200-800 acres of the midchannel islands in the Delta. A portion of restored or enhanced midchannel islands could result in restoration of tidal emergent wetland or valley/foothill riparian habitat.

⁶ Includes ERP nontidal aquatic habitat to be restored within nontidal freshwater permanent emergent habitat.

⁷ Values are estimated for enhancement of grassland in the American River Basin Ecological Management Zone.

Table 5-8: Comparison of Existing NCCP Habitat Area and ERP Target Restoration Habitat Area for the Delta Ecological Management Zone and Ecological Management Units

	Central and West Delta	East Delta	North Delta	South Delta	Total
Existing Habitat Area (acres)					
Aquatic ¹	34,200	3,500	11,000	5,700	54,400
Seasonal wetland	500	600	4,600	400	6,200
Freshwater permanent emergent wetland ²	5,100	1,100	4,700	600	11,500
Valley/foothill riparian	1,000	600	1,400	900	3,900
ERP Habitat Restoration Area (acres)					
Aquatic ¹	2,500	1,000	1,500	2,000	70,003
Seasonal wetland	8,000	6,000	2,000	12,000	28,000
Freshwater permanent emergent wetland ²	TBD	TBD	TBD	TBD	49,600-64,600 ⁴
Valley/foothill riparian	0	100-200	250-450	650-1,150	1,000-1,800 ⁵
Percent Increase in Habitat Area with Implementation of the ERP					
Aquatic ¹	7	29	14	35	13
Seasonal wetland	1,600	1,000	43	3,000	451
Freshwater permanent emergent wetland ²	TBD	TBD	TBD	TBD	431-562
Valley/foothill riparian	0	17-33	18-32	72-128	26-46

Note: Existing habitat extent calculated from the California Central Valley Wetlands and Riparian GIS (CDFG 1997).

- ¹ Includes tidal perennial aquatic NCCP habitat.
- ² Includes tidal freshwater emergent and nontidal freshwater permanent emergent NCCP habitat types.
- ³ Shoal habitat was assumed to be converted from other aquatic habitat and was not included.
- ⁴ Allocation of the restored habitat area among ecological management units has not been determined (TBD = to be determined).
- ⁵ Acreage was estimated from linear targets and assumed widths for widest portion (300 feet), intermediate portion (75 feet) and narrowest portion (35 feet).

Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

MSCS User Guide: This table identifies the evaluated species relative to species goals that could benefit from implementation of the ERP as a result of restoring additional or enhancing existing species habitat that would be available for use by a species (i.e., suitable habitat is restored or enhanced within the occupied range of the species). Species identified in this table as not likely to benefit discernibly from ERP actions are provided conservation measures in the MSCS to fully mitigate adverse impacts and achieve the goal of maintaining the species (“m” goal).

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Mammals			
California wolverine <i>Gulo gulo luteus</i>	m		X
Giant kangaroo rat <i>Dipodomys ingens</i>	m		X
Greater western mastiff-bat <i>Eupomops perotis californicus</i>	m		X
Merced kangaroo rat <i>Dipodomys heermanni dixonii</i>	m		X
Nelson’s antelope ground squirrel <i>Ammospermophilus nelsoni</i>	m		X
Ringtail <i>Bassariscus astutus</i>	m	X	
Riparian brush rabbit <i>Sylvilagus bachmanii riparius</i>	r	X	
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	r	X	
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	m		X
San Joaquin Valley woodrat <i>Neotoma fuscipes riparia</i>	r	X	
San Pablo California vole <i>Microtus californicus sanpabloensis</i>	r	X	
Suisun ornate shrew <i>Sorex ornatus sinuosus</i>	R	X	
Birds			
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	m	X	
American peregrine falcon <i>Falco peregrinus anatum</i>	m	X	
Bald eagle <i>Haliaeetus leucocephalus</i>	m	X	
Bank swallow <i>Riparia riparia</i>	r	X	
Black-crowned night heron (rookery) <i>Nycticorax nycticorax</i>	m	X	
Black tern <i>Chlidonias niger</i>	m	X	
California black rail <i>Laterallus jamaicensis coturniculus</i>	r	X	

¹ While these species are not expected to benefit substantially from ERP actions, conservation measures are provided in the MSCS for these species that address potential adverse effects of all CALFED Program actions and achieve the goal to maintain the species.

Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Birds (continued)			
California clapper rail <i>Kallus longirostris obsoletus</i>	r	X	
California condor <i>Gymnogyps californianus</i>	m		X
California gull <i>Larus californicus</i>	m	X	
California least tern <i>Sterna antillarum browni</i>	m	X	
California yellow warbler <i>Dendroica petechia brewsteri</i>	r	X	
Cooper's hawk <i>Accipiter cooperi</i>	m	X	
Double-crested cormorant (rookery) <i>Phalarocorax auritus</i>	m		X
Golden eagle <i>Aquila chrysaetos</i>	m		X
Grasshopper sparrow <i>Ammodramus savannarum</i>	m	X	
Great blue heron (rookery) <i>Ardea herodias</i>	m	X	
Great egret (rookery) <i>Casmerodius albus</i>	m	X	
Greater sandhill crane <i>Grus canadensis tabida</i>	r	X	
Least Bell's vireo <i>Vireo bellii pusillus</i>	r	X	
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	r	X	
Long-billed curlew <i>Numenius americanus</i>	m	X	
Long-eared owl <i>Asio otus</i>	m	X	
Mountain plover <i>Charadrius montanu</i>	m		X
Northern harrier <i>Circus cyaneus</i>	m	X	
Northern spotted owl <i>Strix occidentalis caurina</i>	m		X
Osprey <i>Pandion haliaetus</i>	m	X	
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	r	X	
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	R	X	

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Birds (continued)			
Short-eared owl <i>Asio flammeus</i>	m	X	
Snowy egret (rookery) <i>Egretta thula</i>	m	X	
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	R	X	
Swainson's hawk <i>Buteo swainsoni</i>	r	X	
Tricolored blackbird <i>Agelaius tricolor</i>	m	X	
Western burrowing owl <i>Athene cunicularia hypugea</i>	m	X	
Western least bittern <i>Ixobrychus auritus</i>	m	X	
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	m	X	
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	r	X	
White-faced ibis <i>Plegadis chibi</i>	m	X	
White-tailed kite <i>Elanus leucurus</i>	m	X	
Yellow-breasted chat <i>Icteria virens</i>	m	X	
Reptiles			
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	m		X
Blunt-nosed leopard lizard <i>Gambelia silus</i>	m		X
Giant garter snake <i>Thamnophis gigas</i>	r	X	
San Joaquin whipsnake <i>Masticophis flagellum ruddocki</i>	m		X
Western pond turtle <i>Clemmys marmorata</i>	m	X	
Amphibians			
California red-legged frog <i>Rana aurora draytoni</i>	m	X	
California tiger salamander <i>Ambystoma californiense</i>	m	X	
Foothill yellow-legged frog <i>Rana boylei</i>	m	X	
Limestone salamander <i>Hydromantes brunus</i>	m		X

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Amphibians (continued)			
Shasta salamander <i>Hydromantes shastae</i>	m		X
Western spadefoot <i>Scaphiopus hammondi</i>	m	X	
Fishes			
Central Coast steelhead Evolutionarily Significant Unit (ESU) <i>Oncorhynchus mykiss</i>	m	X	
Central Valley fall-run chinook salmon <i>Oncorhynchus tshawytscha</i> (fr)	R	X	
Central Valley spring-run chinook salmon <i>Oncorhynchus tshawytscha</i> (sr)	R	X	
Central Valley steelhead ESU <i>Oncorhynchus mykiss</i>	R	X	
Delta smelt <i>Hypomesus transpacificus</i>	R	X	
Green sturgeon <i>Acipenser medirostris</i>	R	X	
Hardhead <i>Mylopharodon conocephalus</i>	m	X	
Longfin smelt <i>Spirinchus thaleichthys</i>	R	X	
Rough sculpin <i>Cottus asperimui</i>	m		X
Sacramento perch <i>Archoplites interruptus</i>	r	X	
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	R	X	
Tidewater goby <i>Encyclogobius newberryi</i>	m		X
Winter-run chinook salmon <i>Oncorhynchus tshawytscha</i> (wt)	R	X	
Invertebrates			
California freshwater shrimp <i>Syncaris pacifica</i>	m		X
Callippe silverspot <i>Speyeria callippe callippe</i>	m		X
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	m		X
Delta green ground beetle <i>Elaphrus viridis</i>	r	X	
Lange's metalmark <i>Apodemis mormo langei</i>	R	X	

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Invertebrates (continued)			
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	m		X
Mid-valley fairy shrimp <i>Branchinecta n. sp. "mid-valley"</i>	m		X
Monarch butterfly (roost) <i>Danaus plexippus</i>	m		X
Shasta sideband <i>Monadenia troglodytes</i>	m		X
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	R	X	
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	m		X
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	m		X
Plants			
Henderson's bent grass <i>Agrostis hendersonii</i>	m		X
Sharsmith's onion <i>Allium sharsmithae</i>	m		X
Rawhide Hill onion <i>Allium tuolumnense</i>	m		X
Sonoma alopecurus <i>Alopecurus aequalis var. sonomensis</i>	m	X	
Large-flowered fiddleneck <i>Amsinckia grandiflora</i>	m		X
Dimorphic snapdragon <i>Antirrhinum subcordatum</i>	m		X
Mt. Diablo manzanita <i>Arctostaphylos auriculata</i>	m		X
Baker's manzanita <i>Arctostaphylos bakeri ssp. bakeri</i>	m		X
Klamath manzanita <i>Arctostaphylos klamathensis</i>	m		X
Contra Costa manzanita <i>Arctostaphylos manzanita ssp. laevigata</i>	m		X
Ione manzanita <i>Arctostaphylos myrtifolia</i>	m		X
Pallid manzanita <i>Arctostaphylos pallida</i>	m		X
Suisun Marsh aster <i>Aster lentus</i>	R	X	
Clara Hunt's milk-vetch <i>Astragalus clarianus</i>	m		X

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Big Bear Valley woollypod <i>Astragalus leucolobus</i>	m		X
Jepson's milk-vetch <i>Astragalus ratianii</i> var. <i>jepsonianus</i>	m		X
Ferris's milk-vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	m	X	
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	r	X	
Heartscale <i>Atriplex cordulata</i>	m		X
Brittlescale <i>Atriplex depressa</i>	m		X
San Joaquin spearscale <i>Atriplex joaquiniana</i>	m	X	
Lesser saltscale <i>Atriplex minuscula</i>	m		X
Vernal Pool smallscale <i>Atriplex persistens</i>	m		X
Lost Hills crownscale <i>Atriplex vallicola</i>	m		X
Sonoma sunshine <i>Blennosperma bakeri</i>	m	X	
Big tarplant <i>Blepharizonia plumosa</i> ssp. <i>plumosa</i>	m		X
Indian Valley brodiaea <i>Brodiaea coronaria</i> ssp. <i>rosea</i>	m		X
Chinese Camp brodiaea <i>Brodiaea pallida</i>	m		X
Mt. Diablo fairy-lantern <i>Calochortus pulchellus</i>	m		X
Tiburon Mariposa lily <i>Calochortus tiburonensis</i>	m		X
Stebbins' morning-glory <i>Calystegia stebbinsii</i>	m		X
San Benito evening-primrose <i>Camissonia benitensis</i>	m		X
Sharsmith's harebell <i>Campanula sharsmithiae</i>	m		X
White sedge <i>Carex albida</i>	m	X	
Bristly sedge <i>Carex comosa</i>	r	X	
Tree-anemone <i>Carpenteria californica</i>	m		X

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Tiburon Indian paintbrush <i>Castilleja affinis</i> ssp. <i>neglecta</i>	m		X
Succulent owl's-clover <i>Castilleja campestris</i> ssp. <i>succulenta</i>	m		X
Mason's ceanothus <i>Ceanothus masonii</i>	m		X
Pine Hill ceanothus <i>Ceanothus roderickii</i>	m		X
Hoover's spurge <i>Chamaesyce hooveri</i>	m		X
Dwarf soaproot <i>Chlorogalum pomeridianum</i> var. <i>minus</i>	m		X
Sonoma spineflower <i>Chorizanthe valida</i>	m		X
Slough thistle <i>Cirsium crassicaule</i>	m	X	
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	R	X	
Mariposa clarkia <i>Clarkia biloba</i> ssp. <i>australis</i>	m		X
Shasta clarkia <i>Clarkia borealis</i> ssp. <i>arida</i>	m		X
Beaked clarkia <i>Clarkia rostrata</i>	m		X
Point Reyes bird's-beak <i>Cordylanthus maritimus</i> ssp. <i>palustris</i>	m	X	
Hispid bird's-beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	m	X	
Soft bird's-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	R	X	
Mt. Diablo bird's-beak <i>Cordylanthus nidularius</i>	m		X
Palmate-bracted bird's-beak <i>Cordylanthus palmatus</i>	m		X
Mt. Hamilton coreopsis <i>Coreopsis hamiltonii</i>	m		X
Silky cryptantha <i>Cryptantha crinita</i>	m	X	
Baker's larkspur <i>Delphinium bakeri</i>	m		X

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Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Hospital Canyon larkspur <i>Delphinium californicum</i> ssp. <i>interius</i>	m		X
Yellow larkspur <i>Delphinium luteum</i>	m		X
Recurved larkspur <i>Delphinium recurvatum</i>	m		X
Four-angled spikerush <i>Eleocharis quadrangulata</i>	m	X	
Brandegee's eriastrum <i>Eriastrum brandegeae</i>	m		X
Hoover's eriastrum <i>Eriastrum hooveri</i>	m		X
Ione buckwheat <i>Eriogonum apricum</i> var. <i>apricum</i>	m		X
Irish Hill buckwheat <i>Eriogonum apricum</i> var. <i>prostratum</i>	m		X
Ben Lomond buckwheat <i>Eriogonum nudum</i> var. <i>decurrens</i>	m		X
Loch Lomond button-celery <i>Eryngium constancei</i>	m		X
Delta coyote-thistle <i>Eryngium racemosum</i>	r	X	
Spiny-sepaled button-celery <i>Eryngium spinosepalum</i>	m		X
Contra Costa wallflower <i>Erysimum capitatum</i> ssp. <i>angustatum</i>	R	X	
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	m		X
Pine Hill flannelbush <i>Fremontodendron decumbens</i>	m		X
Adobe-lily <i>Fritillaria pluriflora</i>	m		X
El Dorado bedstraw <i>Galium californicum</i> ssp. <i>sierrae</i>	m		X
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	m	X	
Diablo helianthella <i>Helianthella castanea</i>	m		X
Hall's tarplant <i>Hemizonia halkiana</i>	m		X
Congdon's tarplant <i>Hemizonia parryi</i> ssp. <i>congdonii</i>	m		X

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Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Brewer's western flax <i>Hesperolinon breweri</i>	m		X
Marin western flax <i>Hesperolinon congestum</i>	m		X
Drymaria-like western flax <i>Hesperolinon drymarioides</i>	m		X
Napa western flax <i>Hesperolinon serpentinum</i>	m		X
Tehama County western flax <i>Hesperolinon tehamense</i>	m		X
Rose-mallow <i>Hibiscus lasiocarpus</i>	m	X	
Santa Cruz tarplant <i>Holocarpha macradenia</i>	m		X
Parry's horkelia <i>Horkelia parryi</i>	m		X
Carquinez goldenbush <i>Isocoma arguta</i>	m		X
Northern California black walnut (native stands) <i>Juglans californica</i> var. <i>hindsii</i>	r	X	
Ahart's dwarf rush <i>Juncus leiospermus</i> var. <i>ahartii</i>	m	X	
Contra Costa goldfields <i>Lasthenia conjugens</i>	m	X	
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	r	X	
Pale-yellow layia <i>Layia heterotricha</i>	m		X
Legenere <i>Legenere limosa</i>	m	X	
San Joaquin woollythreads <i>Lembertia condonii</i>	m		X
Panoche peppergrass <i>Lepidium jaredii</i> ssp. <i>album</i>	m		X
Heckard's peppergrass <i>Lepidium latipes</i> var. <i>heckardii</i>	m		X
Saw-toothed lewisia <i>Lewisia serrata</i>	m	X	
Mason's lilaeopsis <i>Lilaeopsis masonii</i>	R	X	
Pitkin Marsh lily <i>Lilium pardalinum</i> ssp. <i>pitkinense</i>	m	X	

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Bellinger's meadowfoam <i>Limnanthes floccosa</i> ssp. <i>bellingermana</i>	m	X	
Butte County meadowfoam <i>Limnanthes floccosa</i> ssp. <i>californica</i>	m		X
Sebastopol meadowfoam <i>Limnanthes vinculans</i>	m	X	
Delta mudwort <i>Limosella subulata</i>	r	X	
Mt. Tedoc linanthus <i>Linanthus nuttallii</i> ssp. <i>howellii</i>	m		X
Madera linanthus <i>Linanthus serrulatus</i>	m		X
Congdon's lomatium <i>Lomatium congdonii</i>	m		X
Red-flowered lotus <i>Lotus rubriflorus</i>	m		X
Shaggyhair lupine <i>Lupinus spectabilis</i>	m		X
Showy madia <i>Madia radiata</i>	m		X
Hall's bush mallow <i>Malacothamnus hallii</i>	m		X
San Antonio Hills monardella <i>Monardella antonina</i> ssp. <i>antonina</i>	m		X
Few-flowered navarretia <i>Navarretia leucocephala</i> ssp. <i>pauciflora</i>	m	X	
Many-flowered navarretia <i>Navarretia leucocephala</i> ssp. <i>pliantha</i>	m	X	
Pincushion navarretia <i>Navarretia myersii</i>	m	X	
Colusa grass <i>Neostapfia colusana</i>	m	X	
Shasta snow-wreath <i>Neviusia cliftonii</i>	m		X
Antioch Dunes evening-primrose <i>Oenothera deltooides</i> ssp. <i>howellii</i>	R	X	
San Joaquin Valley orcutt grass <i>Orcuttia inaequalis</i>	m		X
Hairy orcutt grass <i>Orcuttia pilosa</i>	m		X

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Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Slender orcutt grass <i>Orcuttia tenuis</i>	m	X	
Sacramento orcutt grass <i>Orcuttia viscida</i>	m	X	
Ahart's paronychia <i>Paronychia ahartii</i>	m		X
Thread-leaved beardtongue <i>Penstemon filiformis</i>	m		X
White-rayed pentachaeta <i>Pentachaeta bellidiflora</i>	m		X
Merced phacelia <i>Phacelia ciliata</i> var. <i>opaca</i>	m		X
Mt. Diablo phacelia <i>Phacelia phacelioides</i>	m		X
Calistoga popcornflower <i>Plagiobothrys strictus</i>	m	X	
North Coast semaphore grass <i>Pleuropogon hooverianus</i>	m	X	
Napa blue grass <i>Poa napensis</i>	m	X	
Marin knotweed <i>Polygonum marinense</i>	m	X	
Eel-grass pondweed <i>Potamogeton zosteriformis</i>	m	X	
Hartweg's golden sunburst <i>Pseudobahia bahiifolia</i>	m		X
San Joaquin adobe sunburst <i>Pseudobahia peirsonii</i>	m		X
California beaked-rush <i>Rhynchospora californica</i>	m	X	
Sanford's arrowhead <i>Sagittaria sanfordii</i>	m	X	
Rock sanicle <i>Sanicula saxatilis</i>	m		X
Mad-dog skullcap <i>Scutellaria lateriflora</i>	m	X	
Marsh skullcap <i>Scutellaria galericulata</i>	m	X	
Red Hills ragwort <i>Senecio clevelandii</i> var. <i>heterophyllus</i>	m		X
Layne's ragwort <i>Senecio layneae</i>	m		X

¹ While these species are not expected to benefit substantially from ERP actions, conservation measures are provided in the MSCS for these species that address potential adverse effects of all CALFED Program actions and achieve the goal to maintain the species.

Table 5-9: MSCS Evaluated Species That Would Likely Benefit from Implementation of the ERP

Evaluation Species	MSCS Species Goal	Species would Likely Benefit	Likely to be No Discernable Species Benefit ¹
Plants (continued)			
Marin checkerbloom <i>Sidalcea hickmanii</i> ssp. <i>viridis</i>	m		X
Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>hydrophila</i>	m	X	
Kenwood Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>valida</i>	m	X	
English peak greenbriar <i>Smilax jamesii</i>	m	X	
Most beautiful jewel-flower <i>Streptanthus albidus</i> ssp. <i>peramoenus</i>	m		X
Mt. Hamilton jewelflower <i>Streptanthus callistus</i>	m		X
Mt. Diablo jewelflower <i>Streptanthus hispidus</i>	m		X
Arburua Ranch jewelflower <i>Streptanthus insignis</i> ssp. <i>hoyii</i>	m		X
Tiburon jewelflower <i>Streptanthus niger</i>	m		X
California seablite <i>Suaeda californica</i>	m	X	
Showy Indian clover <i>Trifolium amoenum</i>	m		X
Greene's tuctoria <i>Tuctoria greenei</i>	m		X
Crampton's tuctoria <i>Tuctoria mucronata</i>	r	X	
California vervain <i>Verbena californica</i>	m		X

¹ While these species are not expected to benefit substantially from ERP actions, conservation measures are provided in the MSCS for these species that address potential adverse effects of all CALFED Program actions and achieve the goal to maintain the species.

5: Effects of CALFED Actions and Conservation Measures

The expected overall effect on each species with an “R” or “r” goal is presented in Table 5-10: Summary Effect of Implementing CALFED Actions and Conservation Measures on Evaluated Species with “R” and “r” Goals. Effects on “m” species are not listed individually; however, the overall effect on all species with an “m” goal (identified in Table 2-2) is an increase in or no discernible adverse affect on the size or distribution of species’ populations. Populations of some evaluated species with an “m” goal are expected to increase as a result of implementing ERP actions that increase the extent or quality of their habitats (Table 5-9).

The findings presented in Tables 5-9 and 5-10 assume: 1) that the entire CALFED Program is implemented, including conservation measures presented in the MSCS; and 2) that the water management strategy is structured in a way that promotes recovery of fish species. The adverse effects associated with partial Program implementation or an unsuccessful EWA will result in deviations from the summary effects presented in Table 5-10.

5.5 CALFED Treatment of Service Area Effects

ESA section 7 implementing regulations require that indirect effects be evaluated in a biological opinion for a federal agency action. Examples of indirect effects caused by delivery of water include growth inducing impacts or changes in cropping patterns. The CALFED Program may affect the reliability and/or timing of water supplies, which may affect habitats of listed species in some CVP and SWP service areas. In addition, section 7 regulations require that interrelated and interdependent actions also be evaluated. The Services cannot issue a biological opinion without considering such actions.

Evaluation of the potential indirect effects resulting from water supply reliability measures is not included in the MSCS . Because this document is programmatic, and the preferred alternative related to water supply reliability will be determined largely in an incremental fashion through adaptive management, it has not been possible to date to evaluate potential service area effects on species and habitats. Project-level or site-specific impacts may not be known until Phase III (implementation) of the CALFED Program. MSCS evaluated species could be affected by changes in water supply reliability that result in land use changes. In addition, other species which have not been evaluated by the MSCS could be affected.

Service area impacts have been addressed in several other water resource-related projects in the Central Valley. The projects include the Bureau of Reclamation’s interim water contract renewals for the CVP, Friant Division contract renewals, CVP O&M and CVPIA implementation, Los Vaqueros

Table 5-10: Preliminary Summary Effect of Implementing CALFED Program Actions with Conservation Measures on Evaluated Species with “R” and “r” Goals

MSCS User Guide: This table presents the expected summary effect of implementing all Program actions and MSCS conservation measures for evaluated species with a “R” or “r” goal. These findings assume 1) implementation of the entire Program, including conservation measures presented in the MSCS, and 2) that the water management component of the program will ultimately be structured in a way that promotes recovery of fish species.

Evaluated Species	Summary Effect of Implementing CALFED Program Actions with Conservation Measures
“R” Goal Species	
Delta smelt (<i>Hypomesus transpacificus</i>)	Restoration and maintenance of Delta smelt populations to levels that ensure the long-term viability of the species.
Longfin smelt (<i>Spirinchus thaleichthys</i>)	Restoration and maintenance of longfin smelt populations to levels that ensure the long-term viability of the species.
Green sturgeon (<i>Acipenser medirostris</i>)	Restoration and maintenance of Central Valley green sturgeon populations to levels that ensure the long-term viability of the species.
Winter-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [wr])	Restoration and maintenance of winter-run chinook populations to levels that ensure the long-term viability of the species.
Central Valley fall-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [fr])	Restoration and maintenance of all runs of Central Valley fall-run chinook salmon populations to levels that ensure the long-term viability of individual runs and the species.
Central Valley spring-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [sr])	Restoration and maintenance of Central Valley spring-run chinook salmon populations in the Sacramento River watershed to levels that ensure the long-term viability of the species.
Central Valley steelhead (<i>Oncorhynchus mykiss</i> [cv]) ESU	Restoration and maintenance of Central Valley steelhead populations to levels that ensure the long-term viability of the species.
Sacramento splittail (<i>Pogonichthys macrolepidotus</i>)	Restoration and maintenance of Sacramento splittail populations to levels that ensure the long-term viability of the species.
Suisun ornate shrew (<i>Sorex ornatus sinuosus</i>), San Pablo song sparrow (<i>Melospiza melodia samuelis</i>), and Suisun song sparrow (<i>Melospiza melodia maxillaris</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the Suisun ornate shrew, San Pablo song sparrow, and Suisun song sparrow populations within their historic range to levels that ensure the long-term viability of the species.
Valley Elderberry Longhorn Beetle (<i>Desmocerus californicus dimorphus</i>)	Restoration, maintenance, and expanded distribution of valley elderberry longhorn beetle populations within its historic range to levels that ensure the long-term viability of the species.
Lange’s metalmark butterfly (<i>Apodemia mormo langei</i>)	Increased numbers and local expansion and long-term protection of the Antioch Dunes population of the Lange’s metalmark butterfly.
Soft bird’s-beak (<i>Cordylanthus mollis</i> ssp. <i>mollis</i>)	Restoration, maintenance, and expanded distribution of soft bird’s-beak populations within its historic range to levels that ensure the long-term viability of the species.
Suisun thistle (<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>)	Establish 10 additional Suisun thistle populations within its historic range and increase the current population by 1,000%.

Table 5-10: Preliminary Summary Effect of Implementing CALFED Program Actions with Conservation Measures on Evaluated Species with “R” and “r” Goals (continued)

Evaluated Species	Summary Effect of Implementing CALFED Program Actions with Conservation Measures
“R” Goal Species (continued)	
Antioch Dunes evening-primrose (<i>Oenothera deltoides ssp. howellii</i>) and Contra Costa wallflower (<i>Erysimum capitatum ssp. angustatum</i>)	Increased numbers and local expansion and long-term protection of the Antioch Dunes population of the Antioch Dunes evening-primrose and Contra Costa wallflower.
Mason’s lilaeopsis (<i>Lilaeopsis masonii</i>) and Suisun Marsh aster (<i>Aster lentus</i>)	Substantial increase in numbers and distribution of Mason’s lilaeopsis within its historic range.
“r” Goal Species	
Salt marsh harvest mouse (<i>Reithrodontomys raviventris</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the salt marsh harvest mouse within the portion of its historic range within the focus area.
San Pablo California vole (<i>Microtus californicus sanpabloensis</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the San Pablo California vole within the portion of its historic range within the focus area.
Riparian brush rabbit (<i>Sylvilagus bachmani riparius</i>)	Long-term protection of the existing riparian brush rabbit population at Caswell State Park from threats that could result in its extirpation and the establishment of up to four additional and self-sustaining populations within the species suspected historical range.
San Joaquin Valley woodrat (<i>Neotoma fuscipes riparia</i>)	Long-term protection of the existing San Joaquin Valley woodrat population at Caswell State Park from threats that could result in its extirpation and increased numbers and expanded distribution of the species within its historical range.
Bank swallow (<i>Riparia riparia</i>)	Long-term protection of existing bank swallow nesting substrates and restoration of ecological processes that create nesting habitat to levels that will allow the species’ population and distribution to naturally expand within its historic range.
California yellow warbler (<i>Dendroica petechia brewsteri</i>) and Little willow flycatcher (<i>Empidonax traillii brewsteri</i>)	Substantial increase in suitable migration habitat and potential for the natural expansion of nesting populations into formerly occupied nesting areas in the Central Valley.
California clapper rail (<i>Rallus longirostris obsoletus</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the California clapper rail within the portion of its historic range within the focus area.
California black rail (<i>Laterallus jamaicensis coturniculus</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the California black rail within its historic range in the Bay and Delta Regions.
Greater sandhill crane (<i>Grus canadensis tabida</i>)	Long-term protection of traditional greater sandhill crane wintering areas and increases in suitable wintering habitat sufficient to support potential future increases in the wintering population.

Table 5-10: Preliminary Summary Effect of Implementing CALFED Program Actions with Conservation Measures on Evaluated Species with “R” and “r” Goals (continued)

Evaluated Species	Summary Effect of Implementing CALFED Program Actions with Conservation Measures
“r” Goal Species (continued)	
Least Bell’s vireo (<i>Vireo bellii pusillus</i>)	Substantial increase in suitable breeding habitat within the historic nesting range of the least Bell’s vireo and the potential for re-establishment of breeding populations in the San Joaquin Valley.
Saltmarsh common yellowthroat (<i>Geothlypis trichas sinuosa</i>)	Increased numbers of and restoration, maintenance, and expanded distribution of the saltmarsh common yellowthroat within the portion of its historic range within the focus area.
Swainson’s hawk (<i>Buteo swainsoni</i>)	Restoration and maintenance of Swainson’s hawk populations in the Central Valley to levels that ensure the long-term viability of the species.
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>)	Substantial increase in suitable breeding habitat within the historic and current breeding range of the western yellow-billed cuckoo and the potential for the natural expansion of the population within the Central Valley.
Sacramento perch (<i>Archoplites interruptus</i>)	Establishment and long-term protection of several new Sacramento perch populations within suitable existing or restored habitat areas within its historic range.
Giant garter snake (<i>Thamnophis gigas</i>)	Long-term protection of existing giant garter snake populations and potential for the natural expansion of Central Valley populations into enhanced and restored suitable habitats.
Delta green ground beetle (<i>Elaphrus viridis</i>)	Long-term protection of existing Delta green ground beetle populations and the establishment and maintenance of 3 additional populations within the species’ historic range.
Northern California black walnut (<i>Juglans californica</i> var. <i>hindsii</i>) (native stands)	Long-term protection of existing native Northern California black walnut stands and establishment and long-term maintenance of up to 10 additional stands within its historic range.
Bristly sedge (<i>Carex comosa</i>)	Potential for the natural expansion or artificial re-establishment of additional bristly sedge populations within its historic range.
Point Reyes bird’s-beak (<i>Cordylanthus maritimus</i> ssp. <i>palustris</i>)	Substantial increases in suitable Point Reyes bird’s-beak habitat within the Bay Region and potential for the natural expansion of the species within existing and enhanced or restored habitat areas.
Crampton’s tuctoria (<i>Tuctoria mucronata</i>)	Long-term protection of existing Crampton’s tuctoria populations and the potential for the natural or artificial expansion of populations in suitable enhanced or restored habitat areas.
Delta mudwort (<i>Limosella subulata</i>) and Delta tule pea (<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>)	Long-term protection of existing occupied Delta mudwort and Delta tule pea habitat and potential for the natural expansion of populations in enhance and restored habitat areas within their historic range.
Delta coyote-thistle (<i>Eryngium racemosum</i>)	Long-term protection of existing Delta coyote-thistle populations and the establishment and maintenance of 2 additional populations within the species’ historic range.

Table 5-10: Preliminary Summary Effect of Implementing CALFED Program Actions with Conservation Measures on Evaluated Species with “R” and “r” Goals (continued)

Evaluated Species	Summary Effect of Implementing CALFED Program Actions with Conservation Measures
“r” Goal Species (continued)	
Alkali milkvetch (<i>Astragalus tener</i> var. <i>tener</i>)	Long-term protection of existing occupied alkali milkvetch populations and the establishment and maintenance of additional populations in historic occupied habitat areas.

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Project, and Solano and Sacramento County contract renewals. In most of these projects, the solution for addressing indirect effects has been to identify a short-term strategy based upon critical species needs for recovery and restoration, and a long-term strategy for dealing with impacts that cannot be predicted at the time the biological opinion is issued.

CALFED proposes the following two-step process to address potential service area effects that are unknown at this time. The first step will be to determine the presence and scope of service area effects, if any. Then, for identified service areas effects, CALFED will address them by integrating proactive, conservation planning approaches with specific conservation measures for Program actions. CALFED will do so by developing the four conservation measures listed below during the remainder of Phase II and during Phase III of the Program

To ensure that CALFED's proposed actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat, CALFED agencies would facilitate developing and implementing a combination of the conservation measures described below, as appropriate for Program actions and their indirect effects. These measures include: (1) facilitating the preparation of HCPs or conservation programs in the service areas, which cover the effects of land use changes (Note: many HCPs which address land use changes already exist in specific locales in CALFED's solution area); (2) evaluating each future water supply reliability program being implemented and including any measures to address indirect effects in the Action-Specific Implementation Plans (ASIPs); (3) developing or contributing to conservation programs which would address critical needs of species in CALFED service areas not already covered by conservation plans; and (4) implementing the conservation measures already in the MSCS which are applicable to conserve species relative to service area effects.

Habitat Conservation Plan(s)

Individuals or entities in service areas benefiting from CALFED actions may complete Habitat Conservation Plans (HCP) which address land use changes related to water delivery changes. An HCP serves as the foundation for an incidental take permit for projects that may impact listed species that do not have a Federal nexus, provided for under section 10(a)1(B) of the ESA. Those actions that do have a Federal nexus could receive incidental take authorization contained in a biological opinion, as provided for under section 7 of the ESA.

CALFED could facilitate the development of conservation plans possibly by providing technical assistance as in the Watershed Management Program.

5: Effects of CALFED Actions and Conservation Measures

Service area water agencies could coordinate the development of an HCP with the assistance (technical or financial) of CALFED. Determination of the scope of the HCP would be the prerogative of the service area agencies consistent with the commitment to, at a minimum, protect species which would be adversely affected by the proposed action and for which we anticipate that incidental take would occur. No change would occur in service areas until the HCP is completed or until contribution to an overall conservation program is provided.

Address Service Area Effects in ASIPs

Specific indirect effects to listed species are impossible to determine precisely at this time because of the current programmatic nature of CALFED actions. Under this approach, an evaluation of water delivery service areas would become part of the required evaluation process in the ASIPs for a water supply reliability action. In the ASIP, specific conservation measures would be developed which address any water delivery-related effects to species and habitats. Chapter 7 of this document describes the ASIPs in detail.

Proactive Development or Contribution to Conservation Programs

The Bureau of Reclamation and Fish and Wildlife Service's Central Valley Project Conservation Program is intended, in concert with other programs, to protect, restore, and enhance the habitat and related needs of special status species in areas affected by the CVP.

Implementation of the Conservation Program is intended to facilitate the "comprehensive section 7 consultation on CVP operations," including implementation of CVPIA. The objectives of the Conservation Program are to: (1) address the needs of threatened and endangered species in an ecosystem-based manner; (2) assist in the conservation of biological diversity, and: (3) improve existing conditions for threatened and endangered species and reduce conflicts with future projects.

The Conservation Program implements the highest-priority recovery actions ("critical needs") for listed species in those areas that receive Federal water. Through the Conservation Program, Reclamation, in coordination with the Service, is implementing a critical needs program for the protection of special status species and their habitats within CVP contract service areas.

As a conservation measure for CALFED actions, CALFED could augment the Conservation Program or similar conservation effort resources to help

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implement species' critical needs. CALFED agencies and/or their beneficiaries could provide additional resources such as funding, lands, and easements to address and protect the critical needs of special status species affected by water deliveries. Actions could include the long-term protection and management of habitat important to the recovery of listed species, and the implementation of the short-term and long-term critical needs.

Implement Conservation Measures included in this MSCS

Many of the MSCS conservation measures are applicable to address service area-related effects on MSCS species and habitats. The implementation of these measures could be expanded to address not only the effects discussed in the MSCS, but also the potential adverse effects resulting in water delivery service areas.

Using the general tools listed above, CALFED and its member agencies will develop a specific plan for addressing water delivery service area effects over the next several months prior to publication of the Final Programmatic EIR/EIS. This plan will be included in the final EIS/EIR.

6: Relationship of the MSCS to Non-CALFED Projects, Programs, and Plans

The CALFED Program and 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. The CALFED Program will be consistent and synergistic with existing wildlife protection and recovery programs within its area of application. Existing efforts include Habitat Conservation Plans (HCPs) approved or under development; other conservation agreements; numerous biological opinions (programmatic and specific) addressing diverse actions within the area; and more than 20 Federal Energy Regulatory Commission (FERC) hydropower relicensing projects. In addition, the Central Valley Project Improvement Act (CVPIA) of 1992 provides for a broad range of habitat enhancement and species protection, much of it within the MSCS focus area. A further effort has been proceeding under SB 1086 to develop a management plan for the Sacramento River system, some of it already funded through CALFED. The CALFED Program must be consistent with all these existing efforts, and will endeavor, through its actions, to enhance their benefits to wildlife.

6.1 Species Conservation Efforts Within CALFED Areas

6.1.1 Habitat Conservation Plans

At least one HCP, the Natomas Basin HCP, has been finalized and is being implemented within the MSCS focus area. Other HCPs that address activities in the MSCS focus area are in different stages of development and are currently being reviewed by the Wildlife Agencies.

On-going species planning efforts that are in the draft stage at the time of release of the Draft MSCS include: Yolo County HCP; San Joaquin County HCP; South Sacramento County HCP; Reclamation District No. 108 Fish Screen HCP; California Aqueduct San Joaquin Field Division HCP; CDFG Striped Bass HCP; PG&E Contra Costa and Pittsburg Facilities HCP. All of these planning efforts incorporate information and measures contained in recovery plans that have been prepared by USFWS and NMFS for listed species.

6.1.2 Candidate Conservation Agreements

The USFWS and NMFS (Services) joint Draft Policy for Candidate Conservation Agreements (CCAs) under the Endangered Species Act of 1973, as amended (Act) would provide incentives for private and other non-Federal property owners, and State and local land managing agencies, to restore, enhance, or maintain habitats for proposed, candidate and certain other unlisted species. CCAs would be developed by participating property owners or State or local land managing agencies to remove the need to list the covered species as threatened or endangered under the Act. Either Service, or the Services jointly, would provide participating property owners and State and local land managing agencies with technical assistance in the development of CCAs and would provide assurances that, if covered species are eventually listed, the property owners or agencies would not be required to do more than those actions agreed to in the CCA. If a species is listed, incidental take authorization would be provided to allow the property owner or agency to implement management activities that may result in take of individuals or modification of habitat consistent with those levels agreed upon and specified in the CCA.

To date, there are no completed CCAs which would affect or be affected by the CALFED Program or MSCS. However, it is possible that CCAs may be implemented in the future in the Central Valley. CCAs would be reviewed in part to determine their consistency with CALFED Program objectives.

6.1.3 Biological Opinions

Existing Biological Opinions: Biological opinions are prepared by NMFS and USFWS pursuant to Section 7 of the ESA. Existing biological opinions are part of the environmental baseline for this MSCS. There are hundreds of biological opinions for actions which overlap with CALFED's focus area. The most notable existing biological opinions that may require modification due to CALFED Program actions are those which affect operations of State and federal water storage and conveyance facilities. These include, but are not limited to the 1995 USFWS opinion on CVP and SWP operations on delta smelt and the 1993 NMFS opinion on CVP and SWP operations on winter-run chinook salmon.

Programmatic Biological Opinions: It is expected that some of the CALFED Program actions may fall within the scope of existing programmatic biological opinions issued by the USFWS. (Note that these existing programmatic opinions are not to be confused with the programmatic biological opinions which NMFS and USFWS will prepare for the CALFED Program.) The USFWS has prepared programmatic biological opinions for, among other activities:

6: Relationship of the MSCS to Non-CALFED Projects, Programs, and Plans

- Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California;
- Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office;
- 404 Permitted Projects that May Affect Four Endangered Plant Species on the Santa Rosa Plain, California;
- Formal Consultation and Conference on the Army Corps Public Notice Number 199500562 for Various Nationwide and Regional General Permits within the 'Legal Delta'; and
- U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo counties, California.

These programmatic consultations evaluate the effects on the above-referenced listed species of certain activities authorized by the U.S. Army Corps of Engineers under the Clean Water Act, the Rivers and Harbors Act, and Federal Highways Administration. The programmatic consultations address impacts in specific geographic areas (typically by county), some of which fall in the MSCS focus area. Incidental take may be authorized for some CALFED actions under the auspices of existing programmatic opinions if the actions meet the requirements of the opinion and if the minimization and monitoring requirements described in the opinion are implemented. The USFWS and NMFS will identify in their programmatic biological opinions those CALFED Program actions that may be covered under existing biological opinions.

6.1.4 FERC Hydropower Relicensing

There are about 24 existing hydroelectric projects within a CALFED area licensed by the FERC that are undergoing relicensing or will be relicensed between 1999 and 2010. These include, but are not limited to, hydropower projects operated by State and private entities and individuals on major tributaries in the Sacramento River Basin (Pit, Feather, American rivers) and the San Joaquin Basin (Mokelumne, Stanislaus, and San Joaquin rivers).

Since hydropower projects impact terrestrial and aquatic resources, including listed species, the relicensing process provides an opportunity for agencies and interested parties to work with the FERC and the licensee so that adverse impacts to fish and wildlife species are minimized. FERC has developed a multi-staged 5-year process for relicensing hydroelectric projects. Relicensing typically begins at least 5 years before expiration of the current license. The FERC issues annual licenses if the process extends beyond the license expiration date.

Federal and State agencies including the USFWS, NMFS, U.S. Forest Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs and tribal interests, CDFG, State Water Resources Control Board, and Department of Water Resources are working on relicensing efforts for hydroelectric projects in a CALFED area. Following license issuance, these agencies, as well as interested parties, will be taking part in the oversight and implementation of license articles, settlement agreement measures, and potential biological opinion requirements over the term of the license (30 years). The FERC process incorporates FESA and CESA requirements. In the event that formal consultation becomes necessary, the FERC develops the project description during the latter stages of their NEPA compliance and provides the USFWS or NMFS with the needed information for a biological opinion.

6.1.5 Central Valley Project Improvement Act

Congress passed the CVPIA in 1992 in an effort to, among other things, protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California. Programs have been developed to address the provisions of the CVPIA, some of which focus on listed and other sensitive species that occur in the MSCS focus area.

The Bureau of Reclamation and USFWS' Central Valley Project Conservation Program is intended, in concert with other programs, to protect, restore, and enhance the habitat and related needs of special status species in areas affected by the CVP. Implementation of this Program is intended to facilitate the "comprehensive Section 7 consultation on CVP operations, including implementation of CVPIA." The objectives of the Conservation Program are to: (1) address the needs of threatened and endangered species in an ecosystem-based manner, (2) assist in the conservation of biological diversity, and (3) improve existing conditions for threatened and endangered species and reduce conflicts with future projects. Meeting these objectives will help ensure that current and future operations of the CVP will not jeopardize the continued existence of any species.

Implementation of the requirements contained in the CVPIA are independent from actions taken by CALFED; nonetheless, activities carried-out under the CVPIA have been, and will continue to be, coordinated with CALFED activities.

6.1.6 State and Local Planning Efforts

The SB 1086 process has been underway since 1986 for the purpose of developing a management plan for the Sacramento River and its tributaries.

6: Relationship of the MSCS to Non-CALFED Projects, Programs, and Plans

This is a significant State, federal, local, and private restoration effort. Some restoration actions recommended through the SB 1086 process have been funded with State Proposition 204 and federal Bay-Delta Act funds through a competitive CALFED proposal solicitation. Further actions within the SB 1086 process will likely complement the measures that are contained in the MSCS.

6.1.7 Other Species Conservation Efforts

Many HCPs and other planning efforts are addressing activities that occur in areas outside the MSCS focus area, but in areas where indirect impacts attributed to water deliveries or other actions may occur. For example, service area impacts which may result in adverse impacts to listed or proposed species may be covered under regional HCPs.

The Bureau of Reclamation and USFWS' Central Valley Project Conservation Program is intended, in concert with other programs, to protect, restore, and enhance the habitat and related needs of special status species in areas affected by the CVP. This Program may serve as a model for proactively addressing the potential effects of water delivery in service areas.

The Conservation Program implements the highest-priority recovery actions ("critical needs") for listed species in those areas that receive Federal water. Through the Conservation Program, Reclamation, in coordination with the USFWS, is implementing a critical needs program for the protection of special status species and their habitats within CVP contract service areas.

6.2 Relationship of the MSCS to On-going Species Programs and Planning Efforts

Even though the above-described programs for the conservation of listed and other sensitive species operate separate from the CALFED Program, significant opportunities exist for the CALFED Program to coordinate and ensure consistency with these efforts. The existing and ongoing planning efforts and programs provide creative ideas for addressing issues that have been raised in the CALFED Program. For example, a "neighboring landowners" program is being developed as part of the San Joaquin and Yolo County HCP efforts. Several of the HCPs being developed address maintenance of levees and waterways. One of the HCPs being developed provides a conservation strategy for operation and maintenance of a fish screen.

6.3 Cumulative Impacts of CALFED and Other Actions

Cumulative effects include the effects of future State, Tribal, local, or private actions affecting listed species and their critical habitat that are reasonably certain to occur in the CALFED problem and solution areas. Future Federal actions not related to CALFED are not considered in determining the cumulative effects, but are subject to separate consultation requirements pursuant to section 7 of the ESA. In addition to the associated Federal projects listed in previous sections of this chapter, the CALFED Bay-Delta Draft Programmatic EIS/EIR lists and describes numerous Federal and non-Federal projects which may contribute to cumulative impacts as defined under NEPA. Most if not all of these projects have a Federal nexus and thus are subject to separate section 7 requirements.

Numerous activities continue to eliminate habitat for listed and proposed threatened and endangered species in the Central Valley. 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 species are also affected by poisoning, shooting, increased predation associated with human development, and reduction of food sources. All of these non-Federal activities are expected to continue to adversely affect listed and proposed species.

7: ESA, CESA, and NCCPA Compliance

CALFED will comply with ESA for adoption of the CALFED Program through programmatic Section 7 consultations with the USFWS and NMFS. The MSCS will serve as the biological assessment of the CALFED Program in support of the programmatic Section 7 consultations. The USFWS and NMFS will use the MSCS biological information and analysis to prepare programmatic biological opinions. The MSCS will also be submitted to CDFG for approval as a programmatic NCCP. The programmatic biological opinions and CDFG's NCCPA determination (collectively, "programmatic consultations") will be completed at the time of the CALFED Record of Decision (ROD). Neither the programmatic biological opinions nor the programmatic NCCPA determination will fully comply with the endangered species acts for individual Program actions or authorize take of the species covered in the MSCS. Instead, ESA, CESA, and NCCPA compliance, including any required take authorization for Program actions, will follow through a streamlined, action-specific consultation process that tiers from the MSCS and the programmatic consultations, or will be covered under existing biological opinions.

For each specific Program action or group of actions, the streamlined consultation process will establish compliance with the ESA, CESA, and the NCCPA on the basis of the information in the programmatic MSCS and the programmatic consultations. If such compliance is demonstrated and the proposed action is described in sufficient detail, biological data are adequate, and appropriate conservation measures are incorporated, a highly streamlined consultation can be achieved. If the proposed action is generally described in the MSCS, but not in sufficient detail to allow for take authorization under ESA Section 7 or the NCCPA, a less streamlined consultation will occur. Some additional information will be required for the necessary regulatory analysis, including assurance that the proposed action is consistent with other aspects of the MSCS. The consultation will necessarily be less streamlined because information is lacking on the action itself or biological data on covered species is inadequate. When the required information has been furnished, take authorization can be provided to the implementing entity.

7.1 Programmatic ESA, CESA, and NCCPA Compliance for the CALFED Program

CALFED will comply with ESA for adoption of the CALFED Program through programmatic ESA Section 7 consultations with the USFWS and NMFS. The MSCS will serve as the biological assessment of the CALFED Program in support of the programmatic Section 7 consultations. The USFWS and NMFS will use the MSCS' biological information to prepare programmatic biological

opinions. The MSCS, in combination with the CALFED ERP, will also be submitted to CDFG for approval as a programmatic NCCP. The programmatic biological opinions and CDFG's NCCPA determination ("programmatic consultations") will be completed at the time the CALFED lead agencies issue a ROD and make findings of fact on the CALFED Program as a whole.

Neither the programmatic biological opinions nor the programmatic NCCPA determination will authorize take of the species covered in the MSCS. (See Section 7.3.2 for a discussion of covered species.) Instead, as discussed below, take authorization for entities implementing CALFED Program actions will follow a streamlined compliance process that tiers from both the MSCS and the programmatic consultations. The subsequent compliance process for some Program actions or groups of action may be complete shortly after CALFED issues the ROD and makes findings of fact for the CALFED Program, depending on the level of detail available about each action and its environmental effects.

Figure 7-1 illustrates the relationship between ESA, CESA, and NCCPA compliance for the CALFED Program and compliance for individual Program actions.

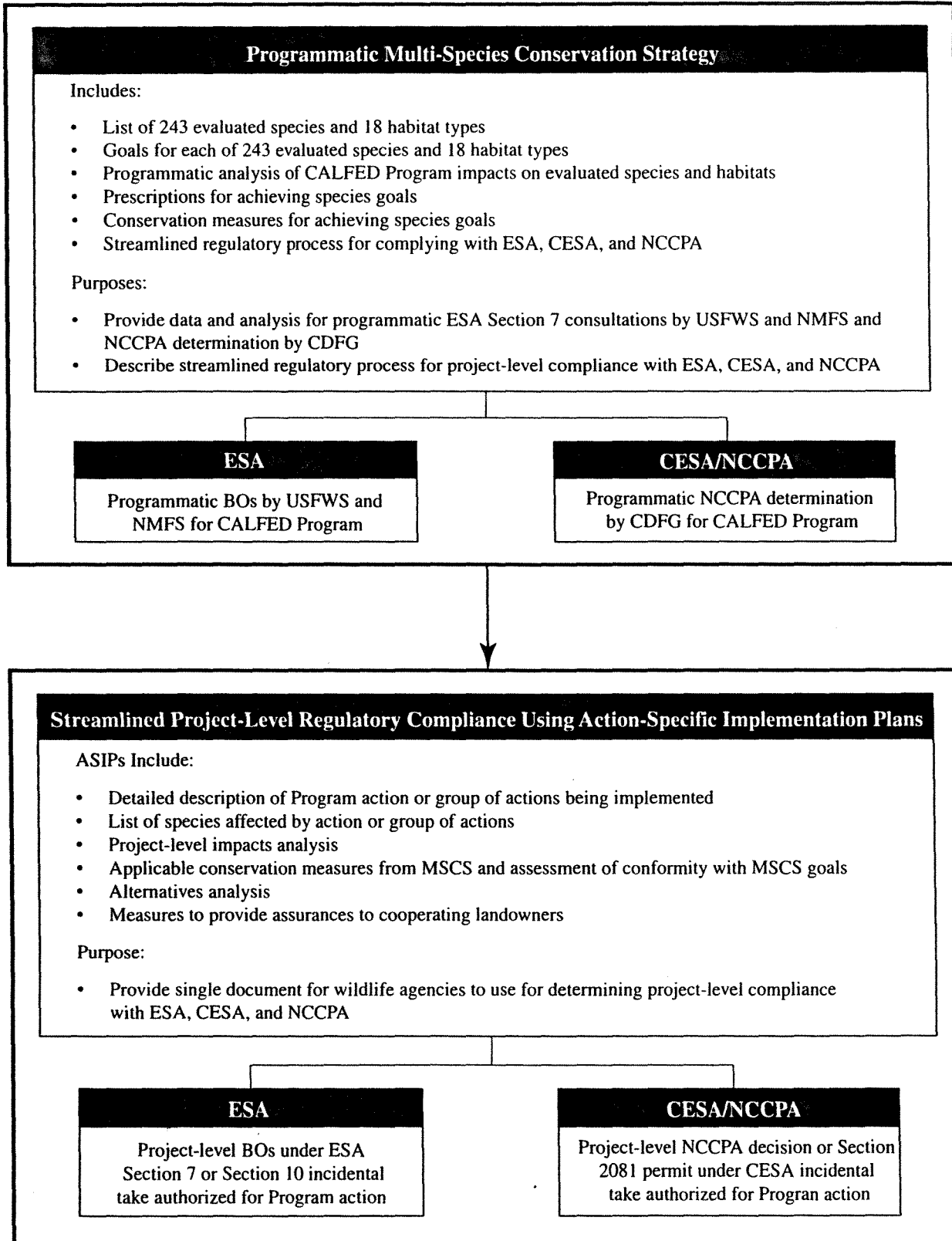
7.2 ESA, CESA, and NCCPA Compliance for Individual Actions or Groups of Actions Within the CALFED Program

Due to the varying level in which CALFED Program actions are currently defined, and the need for additional biological data for some species, the programmatic MSCS does not provide the analysis needed to allow for full compliance with the endangered species laws for all or a subset of Program actions. In most cases, additional information will be required for the Wildlife Agencies to ascertain a CALFED Program action's specific impacts on species to the extent required by ESA, CESA, and the NCCPA. Figure 7-2 illustrates the different level of detail in which CALFED Program actions are currently defined. The MSCS, the programmatic biological opinions, and CDFG's NCCPA determination will therefore serve as the basis for a streamlined regulatory compliance process to allow those entities implementing CALFED actions to comply with ESA, CESA, and the NCCPA and to efficiently obtain any required take authorizations.

7.2.1 Streamlined Compliance Process

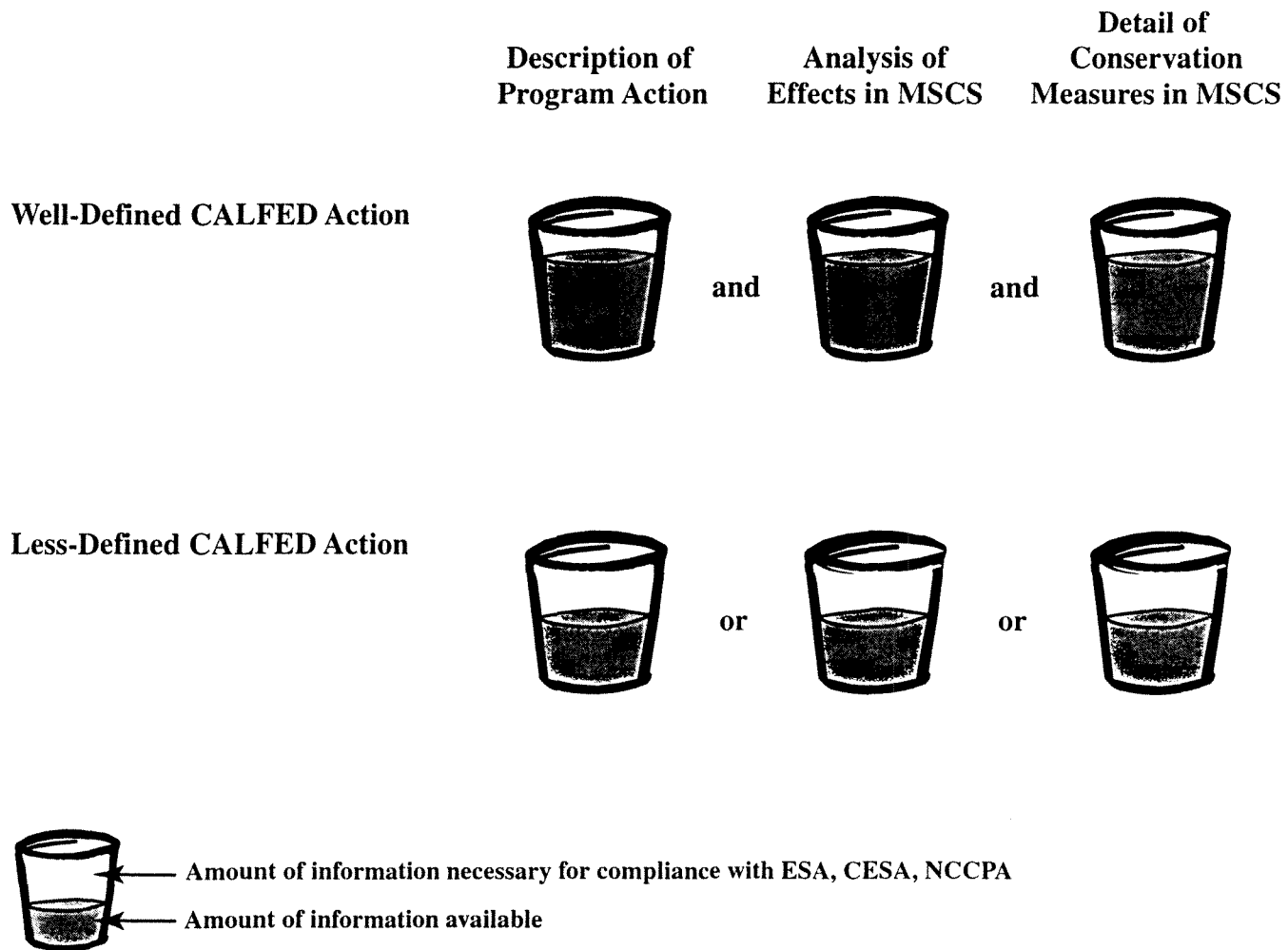
Those entities implementing CALFED Program actions will comply with ESA, CESA, and the NCCPA through a streamlined compliance process that tiers from the MSCS and the programmatic consultations. Entities implementing

Figure 7-1: Programmatic Project-Level Compliance with ESA, CESA, and NCCPA



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Figure 7-2: Information Levels for CALFED Program Actions in MSCS and PEIS/EIR



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7: ESA, CESA, and NCCPA Compliance

CALFED Program actions will be required to prepare an action-specific implementation plan (ASIP) for the proposed Program action or group of actions. The ASIP will be based on and tier from the data, information, analysis, and conservation measures in the MSCS. The implementing entity will submit the ASIP to the Wildlife Agencies, which will use both the MSCS and the ASIPs to meet their respective agency's regulatory requirements for analyzing the effects of Program actions on species. The Wildlife Agencies will authorize take of listed covered species, where appropriate, based on the analysis and conservation measures in the MSCS and the ASIP. The Wildlife Agencies will coordinate their reviews of the ASIP to jointly determine the conservation measures necessary for the issuance of take authorizations under ESA and the NCCPA.

The USFWS and NMFS will review Program actions for compliance with ESA primarily under Section 7 of the ESA. The USFWS and NMFS will consider issuing an ESA Section 10(a)(1)(B) permit if a non-federal entity proposes to implement one or more CALFED actions that are not authorized, funded, or carried out by a federal agency. The ASIP will contain all information required for compliance under either ESA Section 7 or ESA Section 10(a)(1)(B).

The CDFG will review Program actions for compliance with State law primarily under section 2835 of the California Fish and Game Code, which is part of the NCCPA. The ASIP will contain all information required for obtaining take authorization under Section 2835 of the Fish and Game Code. The CDFG may also use Section 2081 of the Fish and Game Code to authorize take of those species evaluated in the MSCS, but not on the MSCS covered species list.

7.2.2 Action-Specific Implementation Plans

To fulfill the requirements of ESA Section 7, ESA Section 10, California Fish and Game Code Section 2835, and California Fish and Game Code Section 2081, each ASIP must include the following:

- a detailed project description of the CALFED Program action or group of actions to be implemented, including site specific and operational information;
- a list of the listed, proposed, and other sensitive species that occur in the action area;
- an analysis identifying the direct, indirect, and cumulative impacts on listed and proposed State and federal species, as well as other sensitive species occurring in the action area (along with an analysis of impacts that may occur to any designated critical habitat) likely to result from the proposed CALFED Program action or group of actions, as well as actions interrelated and interdependent to the proposed action;
- measures the implementing entity will undertake to minimize and mitigate such impacts and measures included in the MSCS to achieve the goal for the affected species, as appropriate; a plan to monitor the impacts and the implementation and effectiveness of the minimization and mitigation measures; the funding that

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will be made available to undertake the minimization and mitigation measures; and the procedures to address changed and unforeseen circumstances;

- measures the implementing entity will undertake to provide assurances to cooperating landowners, consistent with the discussion in section 7.4.5 of the MSCS;
- 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 the Wildlife Agencies may require as necessary or appropriate for compliance with ESA, CESA, and the NCCPA; and
- a description of the relationship between the ASIP for the action or group of actions and the MSCS (i.e., how the ASIP falls under the umbrella of the MSCS).

The ASIPs will be based, in large part, on the biological data, CALFED Program 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 species affected by the proposed CALFED Program actions. Additional information and analysis will be required for many Program actions, as described in section 7.2.3 below. Further, to fully comply with ESA, CESA, and the NCCPA for a CALFED Program action, the Wildlife Agencies may require the ASIP to include additional measures for certain species that are not set forth in this MSCS. The MSCS has reduced the potential for an implementing entity to be required to provide additional Program information, impacts analysis, and conservation measures by offering as much detail as feasible on the expected impacts of Program actions on species and habitats and the expected conservation measures for those impacts.

The MSCS and the ASIPs provide the mechanism for implementing entities to comply with ESA, CESA, and the NCCPA for CALFED Program actions. The ASIPs will not address all regulatory and permitting needs for Program actions. Rather, nearly all CALFED Program actions will require environmental review and permitting under other State and federal laws before the actions can be implemented. The CALFED Program is developing a coordinated environmental review and permitting process for Program actions, which includes the MSCS' streamlined process for complying with ESA, CESA, and NCCPA. The Wildlife Agencies are currently developing methods to streamline their own agency review of Program actions for different permit requirements (i.e., coordinated review of streambed alteration agreements under Fish and Game Code sections 1601 and 1603 and ASIPs under Fish and Game Code section 2835).

7.2.3 Timing of ASIPs for Program Actions

ASIPs will be developed for individual Program actions or groups of actions when enough detailed information is available about the actions to allow the Wildlife Agencies to fully evaluate the impacts on evaluated species and habitats. A Program action will be adequately defined when:

- sufficient details exist about the nature, scope, location, and timing of the action; and
- sufficient site-specific biological data is available.

Some Program actions are well-defined at the programmatic level. For those Program actions that have a significant amount of definition and are analyzed in detail in the MSCS and the PEIS/EIR, it is expected that an ASIP could be developed and completed shortly after the CALFED agencies issue the ROD and make findings of fact for the CALFED Program.

For Program actions that are less defined at the programmatic level, an ASIP could be developed only after the implementing entity has refined the action and produced information on the nature, scope, location, and timing of the action and any additional required biological data.

Figure 7-3 illustrates how the ASIP process will allow Program actions to comply with ESA, CESA, and the NCCPA in relatively less time than a non-CALFED action.

Figure 7-4 illustrates a sample CALFED Program action going through the ASIP process.

7.3 Covered Species

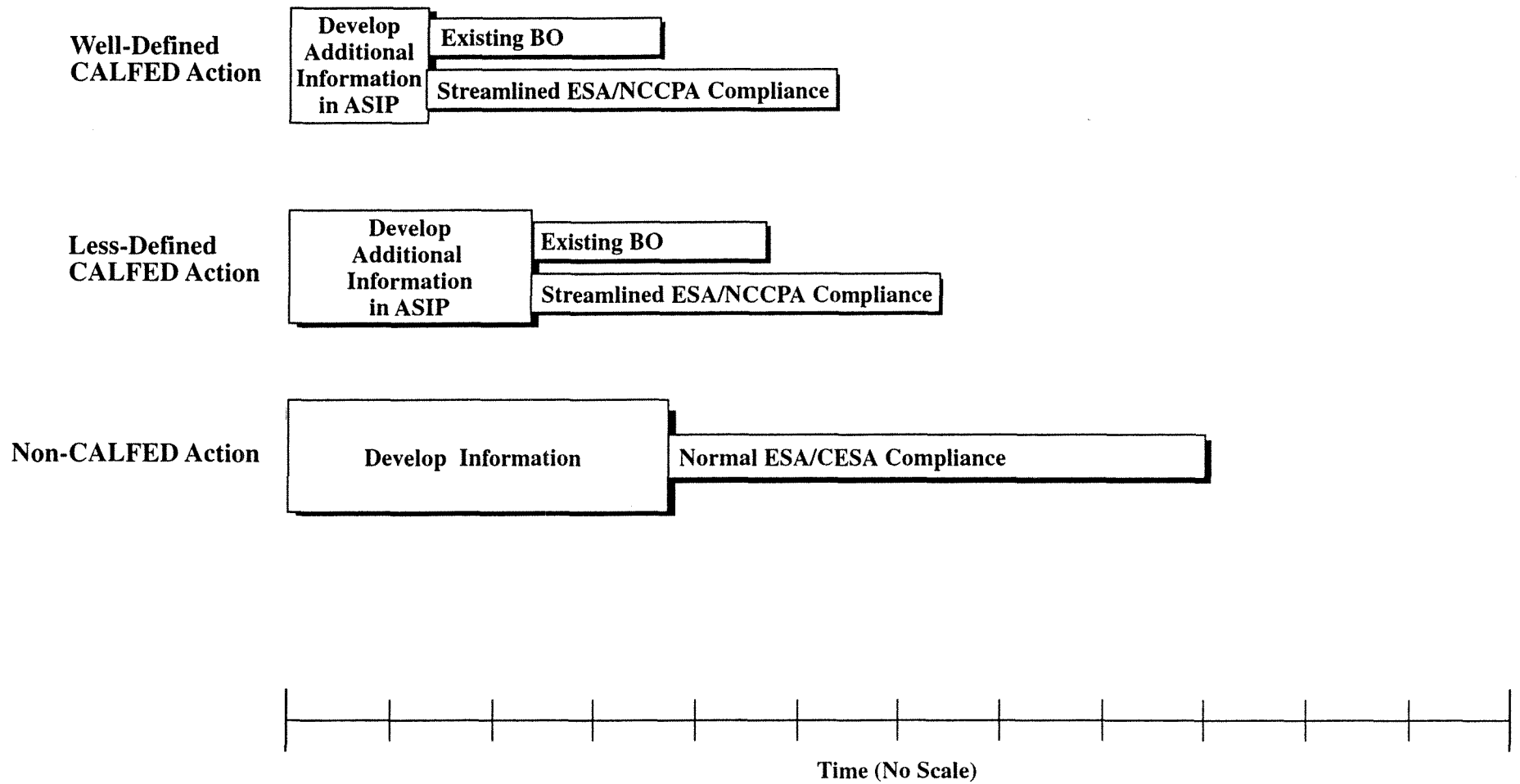
Covered species are discussed in Chapter 2. The process for screening species, development of the preliminary species list and selection of evaluated species is described in Chapter 5.

7.3.1 Incidental Take Authorization for Covered Species

The Wildlife Agencies can authorize the incidental take of covered species under ESA, CESA and the NCCPA based on the MSCS and ASIPs submitted by the proponents of specific Program actions.

The USFWS and NMFS will evaluate each ASIP pursuant to Section 7 and/or Section 10(a) of ESA. The resulting action-specific analysis for the listed and unlisted covered species will be predicated on the programmatic biological

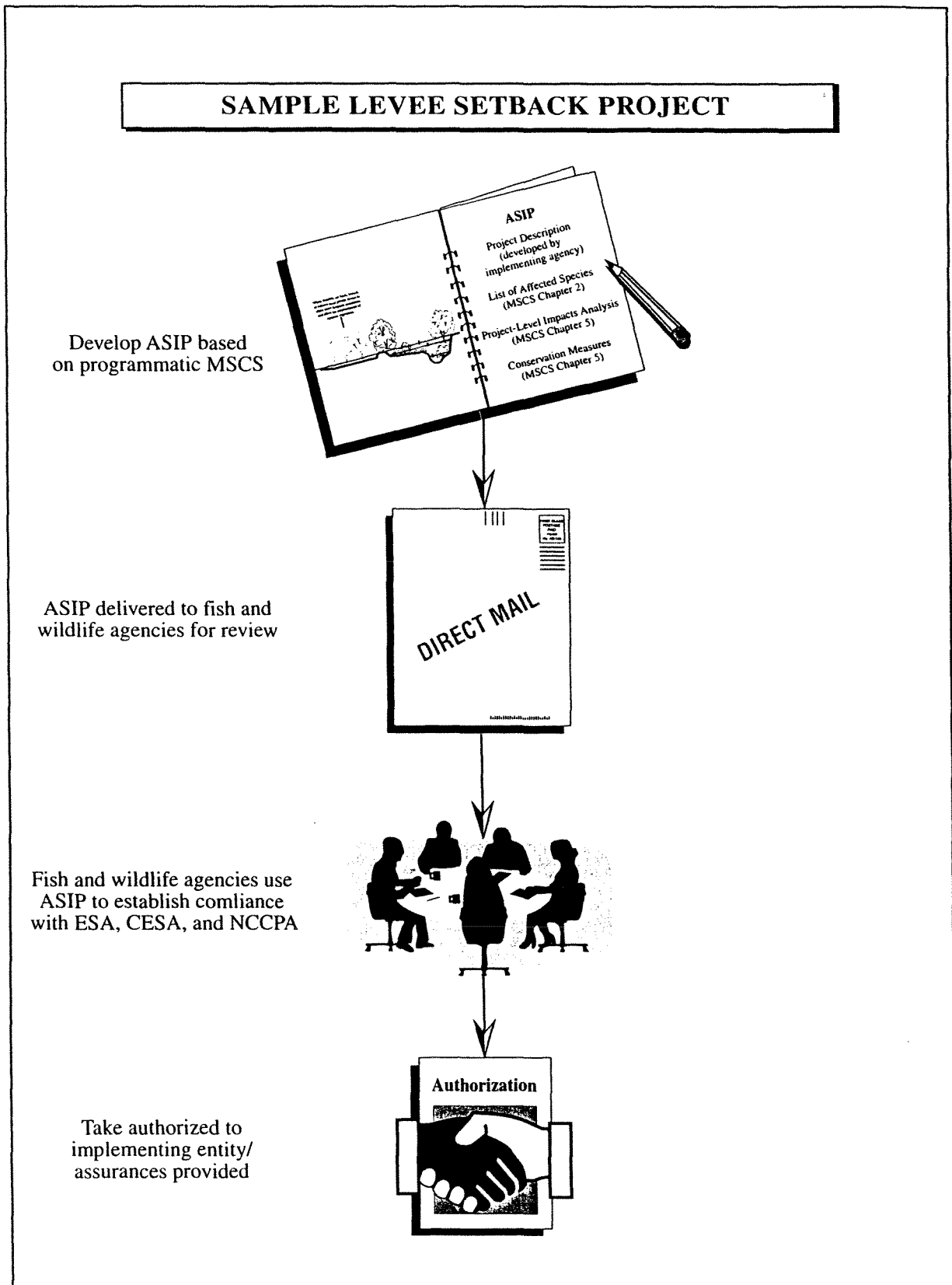
Figure 7-3: Timeline for Processing ASIPs for CALFED Program Actions and Non-CALFED Actions



7: ESA, CESA, and NCCPA Compliance

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Figure 7-4: Illustration of Sample CALFED Project Using ASIP Process



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working independently or in cooperation with one or more State or federal agencies. The precise role of the various implementing entities for the CALFED Program, as well as for the MSCS and ASIPs, will be identified as implementation proceeds.

The entity implementing a Program action or group of actions will be responsible for including MSCS conservation measures in the ASIP: (1) to mitigate the impacts to those species affected by the action(s); and (2) to assist in achieving the Program goals for the species affected by the action(s). Funding for such measures is described in section 7.4.6. Conservation measures in the MSCS for species that will not be affected by the CALFED Program will be implemented throughout the term of the Program to ensure the Program meets its ecosystem restoration goals. Funding for these measures is described in section 7.4.6. Because such conservation measures do not involve species the Program will affect, the conservation measures will not be included as conditions for take authorization through the ASIP process.

The CALFED agencies are exploring different methods of CALFED Program management and governance that will influence how Program actions are implemented. A discussion of governance and Program management is contained in the Phase II Report.

7.4.2 Staging of Program Actions for Implementation

As described in the main text of the PEIS/EIR, the CALFED Program will be implemented in stages. Stage 1 comprises the first seven years of the implementation period. Program actions to be implemented during Stage 1 may be defined in more or less detail at the programmatic level and evaluated at varying levels of specificity in the PEIS/EIR and the MSCS. For those actions requiring ESA, CESA, and NCCPA compliance, the implementing entity(s) will not be able to move forward through the streamlined compliance process until sufficient information is available about the action for the Wildlife Agencies to fully analyze the action's impacts on the species evaluated in the MSCS.

An implementation timeline will be developed by the Wildlife Agencies that outlines the priority of conservation measures to be included in the ASIPs for the bundles of Program actions to be implemented during Stage 1.

7.4.3 *Linking Program Actions for Implementation and the Impact of Linkage on Take Authorization*

The CALFED agencies intend to link Program actions for purposes of implementation. For example, the CALFED agencies expect to link implementation of certain conveyance actions with simultaneous implementation of certain ERP actions. If actions are linked temporally, the requisite project-level information will have to be developed to allow all such actions proceeding collectively to be evaluated in an ASIP.

For those actions that are linked for simultaneous implementation, the Wildlife Agencies can review the actions and their effects on the covered species collectively, where appropriate. For example, certain linked Program actions may have synergistic effects on the covered species that the Wildlife Agencies can evaluate together. Under such circumstances, the Wildlife Agencies can make their determinations under ESA, CESA, and the NCCPA for the linked actions based on their overall beneficial and detrimental impacts to the covered species, rather than the impacts of each action individually. This approach provides implementing entities with an opportunity to further streamline the compliance process for those Program actions that are complementary from a biological standpoint.

The breadth of any permit or authorization provided by the Wildlife Agencies will depend on how Program actions are grouped for implementation (i.e., what Program actions will proceed simultaneously, what actions have been successfully implemented previously). The scope of assurances the Wildlife Agencies provide to implementing entities will also depend on how actions are grouped for implementation and the level of success of previously implemented Program actions.

7.4.4 *Agreements for Implementation*

The CALFED agencies will enter into a memorandum of agreement (MOA) for the MSCS at the time the agencies issue the ROD and adopt findings of fact for the CALFED Program. Through the MOA, the CALFED agencies will agree to implement the MSCS in conjunction with implementation of the CALFED Program. The commitment to implement the MSCS will, necessarily, be described in broad terms in that the implementing entities for the various Program actions have not yet been determined. Specific MSCS implementation requirements for individual Program actions will be included through the ASIP process.

Under Section 7 of the ESA, implementation of measures to minimize the impact of take on species becomes part of a permit or other grant from a federal agency, thereby ensuring implementation of the measures. Under the terms of Section 7, taking that is incidental to and not intended as part of an action is not prohibited, provided that such taking complies with the terms and conditions of an incidental take statement contained in a biological opinion. In most cases, a federal agency includes the terms and conditions contained in a biological opinion in any grant or permit (e.g. a Clean Water Act Section 404 permit) issued to an implementing entity for the exemption in Section 7 to apply. In rare cases, a federal agency does not retain regulatory authority over an action that is covered by an incidental take statement and an agreement must be executed to ensure proper implementation. As incidental take for CALFED actions is authorized under Section 7 by the USFWS and NMFS, these agencies will develop the appropriate type of agreement to ensure implementation.

Some Program actions could involve non-federal entities and have no federal land, funding, or approvals. In these instances, an HCP under ESA Section 10 would be required. Should an HCP that is not a low-effect HCP as described in the *Habitat Conservation Planning Handbook* (USFWS and NMFS 1996) be developed for CALFED actions, an implementing agreement (IA) will be developed to ensure proper implementation of the measures contained in the HCP. An IA identifies responsibilities for implementation of the conservation measures, binds the parties to their respective obligations, and species remedies should any party fail to perform its obligations. An IA also specifies the Wildlife Agencies' assurances for unlisted species on the covered species list and assurances regarding the sufficiency of conservation measures.

The MOA among the CALFED agencies will bind each agency to implement the MSCS such that CDFG can approve the MSCS as a programmatic NCCP. In addition, tiered IAs will be developed between CDFG and the implementing entity for each specific CALFED Program action or group of actions to ensure proper implementation of the MSCS for such action or group of actions. If either the USFWS or NMFS issue a permit under section 10 of the ESA, a single implementing agreement will be developed to satisfy the Wildlife Agencies' respective needs under ESA and the NCCPA.

7.4.5 Assurances

As the ERP, the Environmental Water Account, and other key CALFED Program elements are finalized, funded and implemented, the Wildlife Agencies will rely increasingly on the CALFED Program's environmental benefits when assessing

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the long-term effects of CALFED Program actions on covered species. The potential need for conservation measures that are new or different than the measures in the MSCS is expected to decrease as conditions for covered species improve. The MSCS reflects this fact by including in the streamlined permitting process a means by which assurances can be provided to CALFED agencies and entities and individuals implementing Program actions that the conservation measures approved by the Wildlife Agencies for covered species will not be substantially increased or altered over time. Before implementation of the ERP, the EWA and other key CALFED Program elements is initiated, the assurances that the Wildlife Agencies' can provide will be limited or qualified. However, the Wildlife Agencies will be able to provided increasing assurances over time as implementation proceeds and the goals of the ERP are achieved.

The Wildlife Agencies will provide appropriate assurances regarding each CALFED Program action directly to the CALFED agency or other entity carrying out the action. The assurances will be based on the ASIP developed for the Program action in the MSCS' streamlined permitting process and 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 for covered species. The specific scope and duration of the Wildlife Agencies' assurances will vary depending on the scope and duration of each Program action's impacts to covered species and whether the impacts will recur or continue over an extended period of time.

In addition, the MSCS provides the framework for assuring cooperating landowners that they will not be prevented from continuing their existing land uses because of the implementation of CALFED Program actions or MSCS conservation measures. Many landowners may be concerned that if the number of threatened and endangered species within the focus area increases, the use of land or water in or near the species habitat will be restricted by ESA and CESA. Cooperating landowner programs are intended to address this concern and to preserve compatible land uses within the focus area. Cooperating landowner programs will include where appropriate:

- protections for farmers and ranchers who neighbor land preserved by CALFED agencies for wildlife conservation purposes under the CALFED Program;
- protections for landowners or local public entities who maintain levees on which wildlife habitat will be created or enhanced under the CALFED Program;
- protections for landowners or local public entities who use or divert water from streams or rivers newly opened to anadromous fishes under the CALFED Program; and
- protections for landowners or local public entities who operate and maintain water diversions in which fish screens will be installed under the CALFED Program.

Assurances to CALFED agencies and other entities implementing

CALFED Program actions: The Wildlife Agencies' assurances to CALFED agencies and other implementing entities regarding requirements for additional conservation measures will be based substantially on CALFED Program elements such as the ERP and the Environmental Water Account. Until these Program elements are finalized, funded and implemented, the Wildlife Agencies' assurances will be expressly linked to, or conditioned on, their subsequent implementation. However, the Wildlife Agencies' assurances will generally be provided as follows.

For Program actions in which there is discretionary federal involvement or control, the USFWS and NMFS will provide assurances regarding requirements for additional conservation measures in biological opinions prepared pursuant to Section 7 of ESA. The biological opinion prepared for a Program action will address the listed and unlisted covered species that may be affected by the Program action and can authorize incidental take of the covered species that are listed pursuant to ESA. Each biological opinion will also contain the conservation measures necessary to minimize the impact of take of potentially affected, unlisted covered species. If any of the unlisted covered species addressed in the biological opinion are subsequently listed pursuant to ESA, the biological opinion can authorize the take of the species based on the conservation measures already contained in the biological opinion. As a result, re-initiation of formal consultation regarding the Program action's effects on covered species will not be required under ESA's implementing regulations, unless:

1. the amount or extent of taking specified in the incidental take statement included in the biological opinion for the Program action is exceeded;
2. new information reveals effects of the Program action that may affect covered species or critical habitat in a manner or to an extent not previously considered in the MSCS or the ASIP prepared for the action;
3. the Program action is subsequently modified in a manner that causes an effect to the covered species or critical habitat that was not considered in the biological opinion.

Unless further consultation is required to respond to one of these circumstances, the conservation measures for covered species identified in the biological opinion will not be substantially increased or altered. Moreover, a biological opinion can address a broad array of potential Program action modifications, as well as changed circumstances and unforeseen circumstances. Therefore the likelihood that further consultation will be required can be minimized by fully describing a Program action and its potential modifications, and by identifying potential circumstances which may increase or intensify a Program action's effects on covered species.

7: ESA, CESA, and NCCPA Compliance

For Program actions in which there is no discretionary federal involvement or control, assurances can be provided to the entity implementing the action in accordance with the federal “No Surprises” rule. Incidental take authority for these Program actions will be provided pursuant to Section 10 of ESA. The Section 10 incidental take permit and the “No Surprises” assurances regarding additional conservation measures will be based on the ASIP prepared for the Program action. The incidental take permit will authorize the take of both listed and unlisted (if and when they are listed) covered species that may be affected by the Program action. An implementing agreement will be developed to ensure proper implementation of the measures contained in the ASIP. In the implementing agreement, the USFWS or NMFS, as appropriate, will identify any changed circumstances that may give rise to additional conservation requirements and will assure the implementing entity that additional commitments of land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level provided for covered species in the ASIP and the implementing agreement will not be required without the consent of the implementing entity, consistent with the “No Surprises” rule.

For all Program actions, the State will provide assurances regarding additional conservation measures directly to the CALFED agency or other implementing entity based on the ASIP prepared for each Program action. For all Program actions for which it approves an ASIP, CDFG will provide incidental take authority pursuant to the NCCP Act. The NCCP incidental take authorization will authorize the take of both listed and unlisted covered species that may be affected by a Program action. An implementing agreement will be developed for each Program Action for purposes of the NCCP incidental take authorization. If the USFWS or NMFS will issue an incidental take permit for the Program action, a single implementing agreement will be used for both State and federal incidental take authorizations. In the implementing agreement, CDFG will identify any changed circumstances that may give rise to additional conservation requirements and will assure the implementing entity that additional commitments of land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level provided for covered species in the ASIP and the implementing agreement will not be required without the consent of the implementing entity, unless new or different measures are necessary to prevent a Program action from jeopardizing the continued existence of a covered species.

Cooperating landowner assurances: CALFED agencies and other entities implementing CALFED Program actions are responsible for developing a means to provide appropriate cooperating landowner assurances necessitated by Program actions. Each implementing entity will include cooperating

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landowner protection measures and a plan for providing them in the ASIP prepared for the Program action to be implemented. Based on these measures, the Wildlife Agencies 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 Program action or associated conservation measures.

Acceptance of cooperating landowner assurances will be strictly voluntary. Landowners and local public entities may withdraw from the cooperating landowner assurances program at any time without penalty or disincentive.

The measures necessary to protect cooperating landowners will vary greatly with each CALFED Program action. Specific measures for individual Program actions or groups of Program actions will be developed jointly by the implementing entity and the Wildlife Agencies, in consultation with potentially affected cooperating landowners. However, the following general guidelines apply to cooperating landowner assurances.

Compatible activities: Cooperating landowner assurances will extend only to land uses and activities that are compatible with the MSCS and the CALFED Program. Activities that would undermine or nullify the environmental benefits of the MSCS and the CALFED Program will not be authorized under the MSCS. In general, compatible activities are activities that will not degrade the existing environmental conditions for covered species and will not prevent the MSCS and the CALFED Program from preserving or improving such conditions. A land use or activity that has some adverse effects on covered species may be a compatible activity for purposes of cooperating landowner assurances if minimization or mitigation measures for the adverse effects are included in the appropriate ASIP.

Private property rights: CALFED agencies will fully respect the private property rights of landowners. CALFED agency personnel will not enter upon private lands to implement CALFED Program actions or associated conservation measures without the express permission of the landowner.

Monitoring: Monitoring and site-specific surveys carried out on private land as part of the CALFED Program or the MSCS will be conducted in the least intrusive manner practicable.

Routine and ongoing agricultural activities: Cooperating landowner assurances regarding agricultural activities will allow for the continuation of routine and ongoing agricultural activities on agricultural lands near land preserved by CALFED for wildlife conservation purposes. If necessary, mitigation for incidental take of wildlife originating from preserved wildlife

7: ESA, CESA, and NCCPA Compliance

habitat will be provided by the appropriate CALFED agency or other implementing entity carrying out the Program action or associated conservation measure that resulted in the preservation of wildlife habitat.

Levee maintenance: Cooperating landowner assurances regarding levee maintenance can allow for both routine repair and maintenance and emergency repair and maintenance of levees. If necessary, mitigation for incidental take of wildlife resulting from repair and maintenance of levees on which wildlife habitat has been restored or enhanced will be provided by the CALFED agency or other implementing entity carrying out the Program action or associated conservation measure that resulted in the restoration or enhancement of wildlife habitat on such levees.

Streams newly opened to anadromous fishes: Cooperating landowner assurances for landowners and local public entities who use or divert water from streams that have been newly opened to anadromous fishes will preserve existing, compatible uses to the greatest extent practicable. If necessary, mitigation for incidental take of fish resulting from the continuation of existing, compatible uses in such streams will be provided by the CALFED agency or other implementing entity carrying out the Program action or associated conservation measures that caused the stream to be opened to anadromous fishes. For example, the CALFED agency or other implementing agency will pay for or install fish screens as necessary to preserve existing water diversions.

Installation of fish screens: Cooperating landowner assurances regarding the installation, operation and maintenance of fish screens will preserve existing diversions and will cover any incremental increase in the cost of operating and maintaining the diversion structure that is incurred because of the installation of the fish screen.

7.4.6 Funding

In order to comply with the NCCP guidelines, the MSCS must address how the strategy will be funded. As implementation of the Program proceeds, funding of the conservation measures necessary to mitigate for any detrimental impact to the covered species and the additional measures to achieve species conservation goals, will be addressed in the Action Specific Implementation Plan. The agency or entity initiating the ASIP will provide the funding for the conservation measures necessary to mitigate for Program impacts. Actual implementation of the measures may be accomplished through the Ecosystem Restoration Program.

Several funding strategies are being considered in the Program's financing plan for the implementation of ecosystem restoration actions both in the near-term

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and throughout the 30 year program. The ecosystem restoration actions that are funded through one or more of the options below could be used for implementing the conservation measures in the ASIPs for actions that are necessary to achieve species conservation goals, rather than those necessary to mitigate for Program impacts.

- Option 1 - Combine a broad-based diversion fee and public funding. Adopt fee to allow program flexibility with multiple funding sources.
- Option 2 - Rely on existing public funding sources and consider a user fee in the future only as needed.
- Option 3 - Variation of Option 1 and 2. Impose additional cost sharing requirements on those diverters receiving funding for fish screens and ladders.

Greater detail on the above three options can be found in the PEIS/EIR Implementation Plan Appendix under the Financing Plan section.

7.5 References Cited

CALFED 1999

CALFED. 1999. Phase II Report. Sacramento, California.

USFWS and NMFS 1996

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1996. Habitat Conservation Planning Handbook. November 1996.

8: Monitoring

Monitoring for the CALFED Program serves not only to facilitate compliance and gauge the effectiveness of CALFED actions, but also informs choices under adaptive management. Monitoring needs for the CALFED Program are being developed through CMARP. Specific monitoring needs of the MSCS include: (1) monitoring success in attaining CALFED's species and habitats goals, and (2) monitoring compliance with those measures required in the MSCS for ESA/CESA compliance and specified in any subsequent Section 7 consultation, Section 10(a)(1)(B) permit, NCCP, and/or Section 2081 authorization.

Monitoring will document compliance with ESA/CESA requirements, becoming part of the CALFED permitting process. Subsequent monitoring of the outcome of these required actions will be an essential input to CALFED's adaptive management process.

Monitoring to determine the success of the CALFED Program in attaining the species and habitat goals will be incorporated as part of the CMARP habitats and species monitoring element. That monitoring program is being developed for: (1) evaluating of habitat restoration and connectivity and (2) assessing the capability of existing and restored habitat to support the covered species, and other native biota. The CALFED Program also will provide focused monitoring of population dynamics and behavior of particular species to detect their response to management actions.

Progress toward goals for MSCS evaluated species will be measured primarily through monitoring the distribution and abundance of habitat types over time. This will involve use of a GIS and periodic capture of remotely sensed data. CMARP will be addressing these issues in the first stage of implementation. The requirements for monitoring in support of the MSCS will significantly affect the scope and substance of CMARP. While some on-going monitoring should address MSCS needs for fish and most other "R" and "r" species, additional effort will be required for most species. In many cases, particularly for "m" species, it is expected that CMARP habitat monitoring will provide sufficient information to assess the status of many species. However, specific monitoring for all species will be determined partially based upon the degree of effect the program actions are expected to have on the species.

8.1 Purpose of Monitoring

Monitoring for the CALFED Program serves not only to ensure compliance and gauge the effectiveness of CALFED Program actions, but also informs choices under adaptive management, assists in redefining biological goals, and

provides assessments of species status species and baseline conditions. Monitoring needs for the CALFED Program are being developed through CMARP. Specific monitoring needs for the MSCS are included here as conservation measures; most measures will be identified and developed as part of the CMARP Program.

Specific monitoring needs of the MSCS include monitoring:

- (1) the success of the Program in attaining CALFED's species and habitats goals; and
- (2) compliance with those measures required in the MSCS for ESA/CESA compliance and specified in any subsequent Section 7 consultation, Section 10(a)(1)(B) permit, NCCP, and/or Section 2081 authorization.

8.2 Compliance Monitoring

Monitoring to determine compliance with ESA/CESA/NCCPA requirements will be incorporated as part of CALFED's overall strategy for environmental compliance, which will ensure the Program actions meet various regulatory requirements, such as the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), sections 401 and 404 of the Clean Water Act, ESA, CESA, and NCCPA. Documentation of compliance with ESA/CESA/NCCPA requirements will become part of the permitting process and monitoring for CALFED actions. The information derived from monitoring the success or failure of these actions will be used in determining the actions to be implemented in the next stage of the CALFED Program.

8.3 Effectiveness Monitoring

Monitoring to determine the success of the CALFED Program in attaining the species and habitat goals will be incorporated as part of the CMARP habitats and species monitoring element. That monitoring program is being developed to meet the following CALFED objectives: (1) to provide information suitable for evaluating progress toward the restoration of the spatial extent and connectivity of habitats; and (2) to provide information suitable for assessing the function of existing and restored habitat to support viable populations of the full complement of species native to the ecosystem, especially the species covered by the MSCS.

The monitoring program will describe and track changes in distribution of habitats and distribution of species within those habitats. Species occurrence data will be linked to data on habitat characteristics in terms relevant to habitat quality considerations for the species group in question, as well as habitat attributes affected by management or restoration actions. The Program also will provide focused monitoring of population dynamics and behavior of particular species and species groups to detect species' responses to contrasting habitat

conditions or particular management actions. Specific monitoring needs developed through the MSCS (e.g., the status of a particular species with respect to an established goal) are included in this document as conservation measures. This information will be incorporated into specific CMARP biological monitoring plans as they are developed.

The primary means by which progress towards goals for MSCS species will be measured is expected to be through monitoring the distribution and abundance of habitat types over time. The techniques to achieve the monitoring will involve use of a GIS and some method of periodic capture of remotely sensed data. CMARP will address these issues in the first stage of implementation.

The type of monitoring for NCCP habitats and evaluated species is related to the species conservation goals. For most of the "R" species, particularly the fish species, some monitoring is ongoing and CMARP addresses, at least partially, the MSCS goals for these species. Additional conservation measures for monitoring these species' abundance and distribution to be developed include additional real-time monitoring for species to determine their location in the Delta, microhabitat utilization, and other studies. However, for several species such as the valley elderberry longhorn beetle, the Suisun ornate shrew, the Suisun song sparrow, and four species of plants that are also included in the "R" category, no ongoing monitoring on a regular basis is occurring. As the MSCS is finalized, specific monitoring activities are being developed for these taxa. For "r" species, which include mammals, birds, fish, reptiles, insects, and plants, relatively little monitoring is underway. The MSCS includes monitoring measures, which focus attention towards these species. For most "m" species, it is expected that monitoring will be based upon tracking distribution and abundance of their habitats or ecosystem indicators over time. Adverse effects to the species that may result from CALFED actions will be addressed commensurate with the level of effect on the species. Thus, the monitoring and research requirements for these species will generally relate to the potential Program effects upon the species. For example, if a plant species is located at a proposed reservoir site, considerable attention might be spent on assessing the species status over time to determine whether it is possible to conserve the species while allowing reservoir construction to proceed.

A large share of the monitoring and research requirements associated with the MSCS is expected to be implemented through other facets of CMARP that address monitoring and research requirements for the ERP and other CALFED actions. However, a significant component of CMARP must be developed to address certain elements of the MSCS. In particular, several of the "R" species and all of the "r" species, as well as monitoring habitat conditions for all of the "m" species, will be significant additions to the whole Program. CMARP will

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address the details to accomplish these monitoring and research needs upon finalization of the MSCS.

8.4 Integration

Information gathered through monitoring will be used by the CALFED Program for adaptive management to assist in determining the actions to be implemented in subsequent Program stages.

9: Adaptive Management

Adaptive management is a key component of the CALFED Program. Data from monitoring programs will allow CALFED to determine whether its implementation of the MSCS for NCCP communities and evaluated species is meeting the CALFED Program goals. CALFED will then have an opportunity to adapt its management prescriptions as needed. Adaptive management for CALFED will include assessing management prescriptions embedded in the CALFED Program, implementing revised management strategies as needed, and conducting additional research. Thus, while CALFED Program goals for NCCP communities and evaluated species are expected to remain unchanged, the means used to achieve them can be revised based on the experience gained.

The MSCS will require periodic modification in response to new information. Modifications will reflect changes in the scope of Program actions, species responses to the CALFED Program, effects of the MSCS conservation measures, and actual take.

Adaptive management, a key component of the CALFED Program, will include assessing and refining management prescriptions for the Bay-Delta ecosystem as new information develops from monitoring, implementing management strategies, and conducting additional research. Integrating newly developed information will allow CALFED to determine whether its management prescriptions for NCCP communities and evaluated species, including the conservation measures adopted from the MSCS, are meeting the CALFED Program goals and objectives. CALFED will then have an opportunity to adapt its management prescriptions as needed to ensure the CALFED Program will attain its goals and objectives for NCCP communities and evaluated species. For example, if monitoring reveals that certain CALFED Program actions are not achieving the expected benefits for a species, the CALFED Program will use the new information to redirect management prescriptions so that the CALFED Program actions will achieve the desired benefits. Conversely, if a species reaches management goals prior to completion of all conservation measures, further conservation efforts may not be necessary.

Adaptive management incorporates a dynamic approach to compliance with endangered species laws and regulations. The CALFED Program goals for NCCP communities and evaluated species are generally expected to remain constant; however, the specific conservation measures may be refined to respond to new information. Thus, new or refined conservation measures or

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prescriptions may be incorporated to ensure that the CALFED Program meets its habitat and species goals.

The MSCS will require periodic amendments or modification as information on Program actions, implementation, and biological monitoring and research is developed. Information which may change over the life of the Program includes:

- specific project descriptions;
- Program implementation status;
- species status relative to species goals, or other new biological information resulting from research and monitoring (including new listings, de-listings);
- new species found to be affected by the Program; and
- exceedance of incidental take allowed in biological opinions.

New information does not necessarily require modification of conservation measures; it may be used to modify conservation measures when necessary and appropriate. Ways in which conservation measures may be amended include the development of additional mitigation actions, restoration measures, monitoring, or research needed to meet species goals.

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Attachments

Attachment 1

*Species Considered for Inclusion in the
MSCS but Not Evaluated*

Species Considered for Inclusion in the MSCS but Not Evaluated

MSCS User Guide: This is a list of special-status species known to occur or with potential to occur in the MSCS focus area (i.e., the ERP's 14 Ecological Zones and 12 potential reservoir sites) that were considered but not included in the MSCS because they:

- have no legal protection under federal or California Endangered Species Acts (ESA) or other California Fish and Game Code sections, and are not likely to become federally or California listed as threatened or endangered during the term of CALFED implementation, and

- would not be substantially affected by CALFED actions, or are not rare or limited in distribution.

Additionally, species were not included in the MSCS if there was not enough information on the species' biology to determine effects of CALFED actions and the species had no legal protection.

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
M	American badger	<i>Taxidea taxus</i>	-	CSC	-	X		
M	Berkeley kangaroo rat	<i>Dipodomys beermanni berkeleyensis</i>	-	-	SC		X2	
M	California red tree vole	<i>Phenacomys longicaudus</i>	-	CSC	SC		X2	
M	Fringed myotis	<i>Myotis thysanodes</i>	-	-	SC	X		
M	Hoary bat	<i>Lasiurus cinereus</i>	-	CSC	-		X1	
M	Long-eared myotis	<i>Myotis evotis</i>	-	-	SC		X2	
M	Long-legged myotis	<i>Myotis volans</i>	-	-	SC		X1	
M	Marysville California kangaroo rat	<i>Dipodomys beermanni eximus</i>	-	CSC	SC			X
M	Pacific fisher	<i>Martes pennanti pacifica</i>	-	CSC	SC		X2	
M	Pacific western big-eared bat	<i>Plecotus townsendii townsendii</i>	-	CSC	SC		X1	
M	Pale Townsend's big-eared bat	<i>Plecotus townsendii pallescens</i>	-	CSC	SC	X		
M	Pallid bat	<i>Antrozous pallidus</i>	-	CSC	-		X1	
M	Red bat	<i>Lasiurus borealis</i>	-	-	SC	X		
M	San Joaquin pocket mouse	<i>Perognathus inornatus</i>	-	-	SC	X		
M	Short-nosed kangaroo rat	<i>Dipodomys nitratooides brevinasus</i>	-	CSC	SC		X2	
M	Silver-haired bat	<i>Lasionycteris noctivagans</i>	-	CSC	-		X1	
M	Small-footed myotis	<i>Myotis ciliolabrum</i>	-	-	SC		X2	
M	Spotted bat	<i>Euderma maculatum</i>	-	CSC	SC		X2	

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Potential Effects of CALFED Actions on Species ³					
			Status ²			May be Affected	Not Likely to be Affected	Not Enough Information on the Species
			Federal	State	Other			
M	Tulare grasshopper mouse	<i>Onychomys torridus tularensis</i>	-	-	SC			
M	Yuma myotis	<i>Myotis yumanensis</i>	-	-	SC	X		
B	Alameda song sparrow	<i>Melospiza melodia pusillula</i>	-	CSC	SC		X2	
B	American white pelican	<i>Pelecanus erythrorhynchos</i>	-	CSC	SC	X		
B	Bell's sage sparrow	<i>Ampispiza belli belli</i>	-	CSC	SC		X2	
B	Belted kingfisher	<i>Ceryle alcyon</i>	-	-	SC	X		
B	California horned lark	<i>Eremophila alpestris actia</i>	-	-	SC	X		
B	California spotted owl	<i>Strix occidentalis occidentalis</i>	-	CSC	SC		X2	
B	Ferruginous hawk	<i>Buteo regalis</i>	-	CSC	SC		X1	
B	Harlequin duck	<i>Histrionicus histrionicus</i>	-	CSC	SC		X1	
B	Loggerhead shrike	<i>Lanius ludovicianus</i>	-	CSC	-	X		
B	Merlin	<i>Falco columbarius</i>	-	CSC	-		X1	
B	Northern goshawk	<i>Accipiter gentilis</i>	-	-	SC		X1	
B	Oregon vesper sparrow	<i>Poocetes gramineus affinis</i>	-	-	SC	X		
B	Pacific-slope flycatcher	<i>Empidonax difficilis insulicola</i>	-	-	SC	X		
B	Prairie falcon	<i>Falco mexicanus</i>	-	CSC	-		X1	
B	Purple martin	<i>Progne subis</i>	-	CSC	-		X1	
B	Sacramento Valley song sparrow	<i>Melospiza melodia mailliardi</i>	-	-	SC	X		
B	Sharp-shinned hawk	<i>Accipiter striatus</i>	-	CSC	-		X1	
B	Sora	<i>Porzana carolina</i>	-	-	SC	X		
B	Yellow rail	<i>Coturnicops noveboracensis</i>	-	CSC	-		X1	
B	Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	-	-	SC	X		
R	California horned lizard	<i>Pbrynosoma coronatum frontale</i>	-	CSC	SC	X		
R	Silvery legless lizard	<i>Anniella pulchra pulchra</i>	-	CSC	SC		X2	
A	Cascades frog	<i>Rana cascadae</i>	-	-	SC		X2	
A	Tailed frog	<i>Ascaphus truei</i>	-	CSC	SC		X2	
F	Kern brook lamprey	<i>Lampetra hubbsi</i>	-	CSC	SC		X2	
F	Pacific lamprey	<i>Lampetra tridentata</i>	-	-	SC	X		X
F	Pit roach	<i>Lavinia symmetricus mitrulus</i>	-	CSC	SC		X2	
F	River lamprey	<i>Lampetra ayresi</i>	-	CSC	-			X

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
F	San Joaquin roach	<i>Lavinia symmetricus</i> ssp. (<i>San Joaquin</i>)	-	CSC	SC		X2	
I	Amphibious caddisfly	<i>Desmona bethula</i>	-	-	SC	X		
I	Antioch sphecid wasp	<i>Philanthus nasilis</i>	-	-	SC	X		
I	Antioch Dunes anthicid beetle	<i>Anthicus anthiochensis</i>	-	-	SC	X		
I	Antioch mutillid wasp	<i>Myrmosula pacifica</i>	-	-	SC	X		
I	Antioch cophuran robberfly	<i>Cophura hurdi</i>	-	-	SC	X		
I	Antioch efferian robberfly	<i>Efferia anticobi</i>	-	-	SC	X		
I	Antioch andrenid bee	<i>Perdita scitula antiochensis</i>	-	-	SC	X		
I	Bohart's blue butterfly	<i>Philotiella speciosa bobartorum</i>	-	-	SC	X		
I	Bridges' Coast Range shoulderband snail	<i>Helminthoglypta nickliniana bridgesi</i>	-	-	SC		X2	
I	California linderiella	<i>Linderiella occidentalis</i>	-	-	SC	X		
I	Ciervo aegialian scarab beetle	<i>Aegialia concinna</i>	-	-	SC	X		
I	Curved-foot hygrotus diving beetle	<i>Hygrotus curvipes</i>	-	-	SC	X		
I	Globose dune beetle	<i>Coelus globosus</i>	-	-	SC	X		
I	Gold Rush hanging fly	<i>Orbittacus obscurus</i>	-	-	SC	X		
I	Ground beetle (no common name)	<i>Scaphinotus behrensi</i>	-	-	SC	X		
I	Hurd's metapogon robberfly	<i>Metapogon hurdi</i>	-	-	SC	X		
I	Leech's skyline diving beetle	<i>Hydroporus leechi</i>	-	-	SC			X
I	Marin elfin butterfly	<i>Incisalia mossii</i>	-	-	SC		X2	
I	Merced Canyon shoulderband snail	<i>Helminthoglypta allynsmithi</i>	-	-	SC	X		
I	Middlekauf's shieldback katydid	<i>Idiostatus middlekaufi</i>	-	-	SC	X		
I	Moestan blister beetle	<i>Lytta moesta</i>	-	-	SC	X		
I	Morrison's blister beetle	<i>Lytta morrisoni</i>	-	-	SC	X		
I	Opler's longhorn moth	<i>Adela oplerella</i>	-	-	SC		X2	
I	Redheaded sphecid wasp	<i>Eucerceris ruficeps</i>	-	-	SC	X		

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
I	Ricksecker's water scavenger beetle	<i>Hydrochara rickseckeri</i>	-	-	SC	X		
I	Sacramento anthicid beetle	<i>Anthicus sacramento</i>	-	-	SC	X		
I	Sacramento Valley tiger beetle	<i>Cicindela hirticollis abrupta</i>	-	-	SC	X		
I	San Joaquin tiger beetle	<i>Cicindela tranquebarica ssp.</i>	-	-	SC	X		
I	San Joaquin dune beetle	<i>Coelus gracilis</i>	-	-	SC	X		
I	Sandy beach tiger beetle	<i>Cicindela hirticollis gravida</i>	-	-	SC	X		
I	Williams' bronze shoulderband snail	<i>Helminthoglypta arrosa williamsi</i>	-	-	SC	X		
I	Yellow-banded andrenid bee	<i>Perdita hirticeps luteocincta</i>	-	-	SC	X		
P	Pubescent needlegrass	<i>Achnatherum lemmonii</i> var. <i>pubescens</i>	-	-	3		X2	
P	Jepson's onion	<i>Allium jepsonii</i>	-	-	1B/SC		X2	
P	Forked fiddleneck	<i>Amsinckia vernicosa</i> var. <i>furcata</i>	-	-	SC		X2	
P	Rincon manzanita	<i>Arctostaphylos stanfordiana</i> ssp. <i>decumbens</i>	-	-	1B		X2	
P	Sonoma manzanita	<i>Arctostaphylos canescens</i> ssp. <i>sonomensis</i>	-	-	1B		X2	
P	Nissenan manzanita	<i>Arctostaphylos nissenana</i>	-	-	1B/SC		X2	
P	Northern spleenwort	<i>Asplenium septentrionale</i>	-	-	2		X2	
P	Suksdorf's milkvetch	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i>	-	-	1B/SC		X2	
P	Big-scale balsamroot	<i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>	-	-	1B	X		
P	Western goblin	<i>Botrychium montanum</i>	-	-	2		X2	
P	Mingan moonwort	<i>Botrychium minganense</i>	-	-	2		X2	
P	Upswept moonwort	<i>Botrychium ascendens</i>	-	-	2/SC		X2	
P	Scalloped moonwort	<i>Botrychium crenulatum</i>	-	-	1B/SC	X		
P	Long-haired star-tulip	<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>	-	-	1B		X2	
P	Pleasant Valley mariposa lily	<i>Calochortus clavatus</i> var. <i>avius</i>	-	-	1B/SC		X2	
P	Hoover's calycadenia	<i>Calycadenia hooveri</i>	-	-	1B/SC	X		
P	Santa Cruz Mtns. pussypaws	<i>Calyptridium parryi</i> var. <i>hesseae</i>	-	-	3		X2	

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
P	Mt. Saint Helena morning-glory	<i>Calystegia collina</i> ssp. <i>oxyphylla</i>	-	-	SC		X2	
P	Butte County morning-glory	<i>Calystegia atriplicifolia</i> ssp. <i>buttensis</i>	-	-	3/SC		X2	
P	Wilkin's harebell	<i>Campanula wilkinsiana</i>	-	-	1B/SC		X2	
P	Dissected-leaf toothwort	<i>Cardamine pachystigma</i> var. <i>dissectifolia</i>	-	-	3		X2	
P	Shore sedge	<i>Carex limosa</i>	-	-	2		X2	
P	Fox sedge	<i>Carex vulpinoidea</i>	-	-	2	X		
P	Pointed broom sedge	<i>Carex scoparia</i>	-	-	2		X2	
P	Slender sedge	<i>Carex lasiocarpa</i>	-	-	2	X		
P	Sonoma ceanothus	<i>Ceanothus sonomensis</i>	-	-	1B/SC		X2	
P	Calistoga ceanothus	<i>Ceanothus divergens</i>	-	-	1B/SC		X2	
P	Rincon Ridge ceanothus	<i>Ceanothus confusus</i>	-	-	1B/SC		X2	
P	Red Hills soaproot	<i>Chlorogalum grandiflorum</i>	-	-	1B/SC		X2	
P	San Benito spineflower	<i>Chorizanthe biloba</i> var. <i>immemora</i>	-	-	1B		X2	
P	Mt. Hamilton thistle	<i>Cirsium fontinale</i> var. <i>campylon</i>	-	-	1B/SC	X		
P	Mosquin's clarkia	<i>Clarkia mosquinii</i>	-	-	1B	X		
P	Enterprise clarkia	<i>Clarkia mosquinii</i> ssp. <i>xerophila</i>	-	-	1B/SC		X2	
P	Small's southern clarkia	<i>Clarkia australis</i>	-	-	1B		X2	
P	Santa Clara red ribbons	<i>Clarkia concinna</i> ssp. <i>automixa</i>	-	-	1B/SC	X		
P	White-stemmed clarkia	<i>Clarkia gracilis</i> ssp. <i>albicaulis</i>	-	-	1B		X2	
P	Talus collomia	<i>Collomia larsentii</i>	-	-	2		X2	
P	Serpentine cryptantha	<i>Cryptantha clevelandii</i> var. <i>dissita</i>	-	-	1B		X2	
P	Clustered lady's-slipper	<i>Cypripedium fasciculatum</i>	-	-	SC		X2	
P	Western leatherwood	<i>Dirca occidentalis</i>	-	-	1B	X		
P	Dwarf downingia	<i>Downingia pusilla</i>	-	-	2	X		
P	Golden draba	<i>Draba aureola</i>	-	-	1B		X2	
P	English sundew	<i>Drosera anglica</i>	-	-	2		X2	
P	Oregon fireweed	<i>Epilobium oregonum</i>	-	-	1B/SC		X2	
P	Narrow-leaved daisy	<i>Erigeron angustatus</i>	-	-	1B		X2	
P	Streamside daisy	<i>Erigeron biolettii</i>	-	-	3		X2	
P	Mt. Diablo buckwheat	<i>Eriogonum truncatum</i>	-	-	1A/SC		X2	

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
P	Tiburon buckwheat	<i>Eriogonum luteolum</i> var. <i>caninum</i>	-	-	3		X2	
P	Snow Mountain buckwheat	<i>Eriogonum nervulosum</i>	-	-	1B/SC		X2	
P	Tuolumne fawn lily	<i>Erythronium tuolumnense</i>	-	-	1B		X2	
P	Butte County fritillary	<i>Fritillaria eastwoodiae</i>	-	-	1B/SC		X2	
P	Talus fritillary	<i>Fritillaria falcata</i>	-	-	1B/SC	X		
P	Fragrant fritillary	<i>Fritillaria liliacea</i>	-	-	1B/SC		X2	
P	Stinkbells	<i>Fritillaria agrestis</i>	-	-	4	X		
P	Bisbee Peak rush-rose	<i>Helianthemum suffrutescens</i>	-	-	3		X2	
P	Hayfield tarplant	<i>Hemizonia congesta</i> ssp. <i>leucocephala</i>	-	-	3		X2	
P	Two-carpellate western flax	<i>Hesperolinon bicarpellatum</i>	-	-	1B/SC		X2	
P	Red Bluff dwarf rush	<i>Juncus leiospermus</i> var. <i>leiospermus</i>	-	-	1B		X2	
P	Coulter's goldfields	<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	-	-	1B	X		
P	Dubious pea	<i>Lathyrus sulphureus</i> var. <i>argillaceus</i>	-	-	3		X2	
P	Colusa layia	<i>Layia septentrionalis</i>	-	-	1B		X2	
P	Munz's tidy-tips	<i>Layia munzii</i>	-	-	1B	X		
P	Rayless layia	<i>Layia discoidea</i>	-	-	1B		X2	
P	Woolly-headed lessingia	<i>Lessingia hololeuca</i>	-	-	3		X2	
P	Stebbins' lewisia	<i>Lewisia stebbinsii</i>	-	-	1B/SC		X2	
P	Howell's lewisia	<i>Lewisia cotyledon</i>	-	-	3		X2	
P	Cantelow's lewisia	<i>Lewisia cantelovii</i>	-	-	1B		X2	
P	Woolly meadowfoam	<i>Limnanthes floccosa</i> ssp. <i>floccosa</i>	-	-	2		X2	
P	Madera linanthus	<i>Linanthus serrulatus</i>	-	-	1B	X		
P	Cobb Mountain lupine	<i>Lupinus sericatus</i>	-	-	1B		X2	
P	Anthony Peak lupine	<i>Lupinus antoninus</i>	-	-	1B/SC		X2	
P	Quincy lupine	<i>Lupinus dalesiae</i>	-	-	1B		X2	
P	Stebbins' madia	<i>Madia stebbinsii</i>	-	-	1B/SC		X2	
P	Niles madia	<i>Madia doris-nilesiae</i>	-	-	1B		X2	
P	Hall's madia	<i>Madia hallii</i>	-	-	1B/SC		X2	
P	Indian Valley bush mallow	<i>Malacothamnus aboriginum</i>	-	-	1B		X2	
P	Nelson's pepperwort	<i>Marsilea oligospora</i>	-	-	3	X		

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Potential Effects of CALFED Actions on Species ³					
			Status ²			May be Affected	Not Likely to be Affected	Not Enough Information on the Species
			Federal	State	Other			
P	Serpentine monkeyflower	<i>Mimulus brachiatus</i>	-	-	3		X2	
P	The Lassics sandwort	<i>Minuartia decumbens</i>	-	-	1B/SC		X2	
P	Merced monardella	<i>Monardella leucocephala</i>	-	-	1A/SC		X2	
P	Veiny monardella	<i>Monardella douglasii</i> ssp. <i>venosa</i>	-	-	1B/SC		X2	
P	Robust monardella	<i>Monardella villosa</i> ssp. <i>globosa</i>	-	-	1B		X2	
P	Little mousetail	<i>Myosurus minimus</i> ssp. <i>apus</i>	-	-	3/SC	X		
P	Marin County navarretia	<i>Navarretia rosulata</i>	-	-	1B		X2	
P	Baker's navarretia	<i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	-	-	1B	X		
P	Shining navarretia	<i>Navarretia nigelliformis</i> ssp. <i>radians</i>	-	-	1B	X		
P	Sonoma beardtongue	<i>Penstemon newberryi</i> var. <i>sonomensis</i>	-	-	1B		X2	
P	Closed-throated beardtongue	<i>Penstemon personatus</i>	-	-	1B/SC		X2	
P	Gairdner's yampah	<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	-	-	SC		X2	
P	Stebbins' phacelia	<i>Phacelia stebbinsii</i>	-	-	1B/SC		X2	
P	Moss phlox	<i>Pblox muscoides</i>	-	-	2		X2	
P	Engelmann spruce	<i>Picea engelmannii</i>	-	-	2		X2	
P	Horned butterwort	<i>Pinguicula vulgaris</i>	-	-	2		X2	
P	Hooked popcornflower	<i>Plagiobothrys uncinatus</i>	-	-	1B/SC	X		
P	Petaluma popcornflower	<i>Plagiobothrys mollis</i> var. <i>vestitus</i>	-	-	1A		X2	
P	Bearded popcornflower	<i>Plagiobothrys bystriculus</i>	-	-	1A		X2	
P	Hairless popcornflower	<i>Plagiobothrys glaber</i>	-	-	1A		X2	
P	California sycamore	<i>Platanus racemosa</i>	-	-	SC	X		
P	Douglas' pogogyne	<i>Pogogyne douglasii</i> ssp. <i>parviflora</i>	-	-	3	X		
P	Slender-leaved pondweed	<i>Potamogeton filiformis</i>	-	-	2	X		
P	Nuttall's pondweed	<i>Potamogeton epiphydrus</i> ssp. <i>nuttallii</i>	-	-	2		X2	
P	White-stemmed pondweed	<i>Potamogeton praelongus</i>	-	-	2	X		
P	Sticky pyrrocoma	<i>Pyrrocoma lucida</i>	-	-	1B		X2	
P	Hall's rupertia	<i>Rupertia hallii</i>	-	-	1B		X2	
P	Tracy's sanicle	<i>Sanicula tracyi</i>	-	-	1B/SC		X2	
P	American scheuchzeria	<i>Scheuchzeria palustris</i> var. <i>americana</i>	-	-	2	X		

(continued)

Species Considered for Inclusion in the MSCS but Not Evaluated (continued)

Type ¹	Common Name	Scientific Name	Status ²			Potential Effects of CALFED Actions on Species ³		
			Federal	State	Other	May be Affected	Not Likely to be Affected	Not Enough Information on the Species
P	Water bulrush	<i>Scirpus subterminalis</i>	-	-	2		X2	
P	Slender bulrush	<i>Scirpus heterochaetus</i>	-	-	2		X2	
P	Canyon Creek stonecrop	<i>Sedum paradisum-</i>	-	-	1B/SC		X2	
P	Feather River stonecrop	<i>Sedum albomarginatum</i>	-	-	1B		X2	
P	Cut-leaved ragwort	<i>Senecio eurycephalus</i> var. <i>lewisrosei</i>	-	-	1B		X2	
P	Rayless ragwort	<i>Senecio aphanactis</i>	-	-	2		X2	
P	Sweet marsh ragwort	<i>Senecio hydrophiloides</i>	-	-	3		X2	
P	Butte County checkerbloom	<i>Sidalcea robusta</i>	-	-	1B/SC		X2	
P	Point Reyes checkerbloom	<i>Sidalcea calycosa</i> ssp. <i>rhizomata</i>	-	-	1B		X2	
P	Western campion	<i>Silene occidentalis</i> ssp. <i>longistipitata</i>	-	-	3/SC		X2	
P	Cascade alpine campion	<i>Silene suksdorfii</i>	-	-	2		X2	
P	Lassen Peak smelowskia	<i>Smelowskia ovalis</i> var. <i>congesta</i>	-	-	1B/SC		X2	
P	Prairie wedge grass	<i>Sphenopholis obtusata</i>	-	-	2		X2	
P	Long-leaved starwort	<i>Stellaria longifolia</i>	-	-	2		X2	
P	Obtuse starwort	<i>Stellaria obtusa</i>	-	-	2		X2	
P	Kruckeberg's jewelflower	<i>Streptanthus morrisonii</i> ssp. <i>kruckebergii</i>	-	-	1B/SC		X2	
P	Three Peaks jewelflower	<i>Streptanthus morrisonii</i> ssp. <i>elatus</i>	-	-	1B/SC		X2	
P	Freed's jewelflower	<i>Streptanthus brachiatus</i> ssp. <i>hoffmanii</i>	-	-	1B/SC		X2	
P	Socrates mine jewelflower	<i>Streptanthus brachiatus</i> ssp. <i>brachiatus</i>	-	-	1B/SC		X2	
P	Mt. Tamalpais jewelflower	<i>Streptanthus glandulosus</i> ssp. <i>pulchellus</i>	-	-	1B		X2	
P	Morrison's jewelflower	<i>Streptanthus morrisonii</i> ssp. <i>morrisonii</i>	-	-	1B/SC	X	X2	
P	Wright's trichocoronis	<i>Trichocoronis wrightii</i> var. <i>wrightii</i>	-	-	2	X		
P	Northern daisy	<i>Trimorpha acris</i> var. <i>debilis</i>	-	-	2		X2	
P	San Francisco owl's-clover	<i>Triphysaria floribunda</i>	-	-	1B		X2	
P	Caper-fruited tropidocarpum	<i>Tropidocarpum capparideum</i>	-	-	1A/SC		X2	
P	Siskiyou Mtns. huckleberry	<i>Vaccinium coccineum</i>	-	-	3		X2	
P	Woolly violet	<i>Viola tomentosa</i>	-	-	1B		X2	
P	El Dorado County mule ears	<i>Wyethia reticulata</i>	-	-	1B/SC		X2	

Notes:

¹**Type:** M = mammal, B = bird, R = reptile, A = amphibian, F = fish, I = invertebrate, P = plant

²**Status:**

State

CSC = California species of special concern

Other

1A = California Native Plant Society List 1A

1B = California Native Plant Society List 1B

2 = California Native Plant Society List 2

3 = California Native Plant Society List 3

SC = Other species of concern identified by CALFED

³**Potential Effects of CALFED Actions on Species**

May be Affected:

X = species are associated with habitat types or occur at specific locations that may be adversely or beneficially affected by CALFED depending on where CALFED actions would be implemented, or species that are uncommon or transient in the Conservation Strategy focus area and may be affected by CALFED depending on when or where CALFED actions would be implemented.

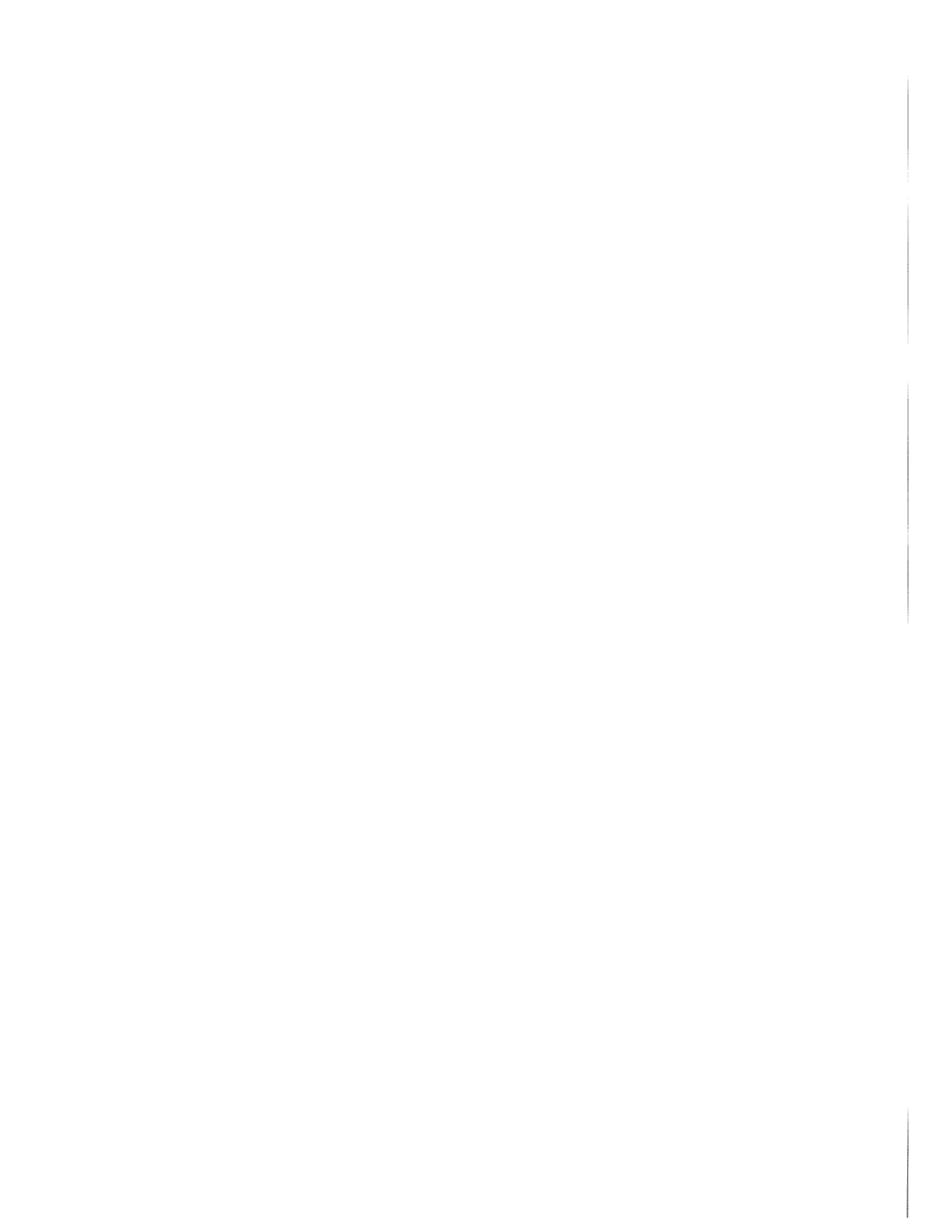
Not Likely to be Affected:

X1 = CALFED actions do not affect the species because habitat is not limiting and the species is mobile.

X2 = Species occurs in areas that would not be affected by CALFED actions.

Not Enough Information on the Species:

X = Not enough information on the species' biology or distribution to make a determination of effects.



Attachment 2

Proposed CALFED Actions Evaluated in the MSCS



Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program¹				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento -San Joaquin Delta	Provide a March outflow that occurs from the natural late-winter and early-spring peak in inflow from the Sacramento River. The outflow should be at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below-normal years, and 40,000 cfs for 10 days in above-normal water years. Wet year outflow are generally adequate under the present level of development.	E010101	Prescribed outflows in March should be met by the cumulative flows of prescribed flows for the Sacramento, Feather, Yuba, and American Rivers. It will be necessary to obtain assurances (e.g., limit Delta diversions) that these prescribed flows will be allowed to contribute to Delta outflow. A portion of the inflow would be from base (minimum) flows from the east Delta tributaries and the San Joaquin River and its tributaries.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		<p>Provide a late-April to early May outflow that emulates the spring inflow from the San Joaquin River. The outflow should be at least 20,000 cfs for 10 days in dry years, 30,000 cfs in below normal years, and 40,000 cfs in above normal years. These flows would be achieved through base flows from the Sacramento River and flow events from the Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced Rivers.</p>	E010102	<p>Prescribed outflows in late April and early May should be met by the cumulative flows of prescribed flows from the Stanislaus, Tuolumne, and Merced Rivers (see East San Joaquin Basin Ecological Zone), and Mokelumne and Calaveras Rivers (see Eastside Delta Tributaries Ecological Zone). It will be necessary to obtain assurances that these prescribed flows will be allowed to contribute to Delta outflow. The flow event would be made up of base flows from the Sacramento River, its tributaries, and the Cosumnes River, plus Mokelumne, Calaveras, and San Joaquin tributary pulsed flows prescribed under the May 1995 Water Quality Control Plan, and by additional supplemental flows.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento -San Joaquin Delta	Provide a fall or early winter outflow that emulates the first "winter" rain through the Delta.	E010103	Allow the first "significant" natural flow into the Delta (most likely from rainfall or from unimpaired flows from tributaries and lower watersheds below storage reservoirs or from flows recommended by DFG and Anadromous Fish Restoration Program (AFRP) to pass through the Delta to the San Francisco Bay by limiting water diversions from the Delta for up to 10 days. (No supplementary release of stored water from reservoirs would be required above that required to meet flows prescribed by DFG and AFRP.)
		Provide a minimum flow of 13,000 cfs on the Sacramento River below Sacramento in May of all but critical years (U.S. Fish and Wildlife Service 1995).	E010104	Supplement flows in May of all but critical years as needed from Shasta, Orville, and Folsom Reservoirs to maintain an inflow of 13,000 cfs to the Delta.
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.	Sacramento -San Joaquin Delta	Reestablish more natural internal Delta water flows in channels	E010601	Reduce velocities in selected Delta channels by increasing cross-sectional areas of channel via setback levees or by constricting flows into and out of the channels.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table A: Delta Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channelflow.	Sacramento -San Joaquin Delta	Reestablish more natural internal Delta water flows in channels	E010602	Restrict tidal flow and cross-Delta transfer of water to south Delta pumping plants to selected channels to lessen flow through other channels.
			E010603	Manage the operation of existing physical barriers so that resulting hydraulics upstream and downstream of the barrier are more similar to levels in the mid-1960s.
			E010604	Close the DCC when opportunities allow, as specified in the 1995 Water Quality Control Plan and recommended by USFWS (U.S. Fish and Wildlife Service 1995), in the period from November through January when appropriate conditions trigger closure (i.e., internal Delta exports are occurring).

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.</p>	<p>Sacramento -San Joaquin Delta</p>	<p>Maintain net downstream flows in the mainstem San Joaquin River from Vernalis to immediately west of Stockton during the period from September through November to help sustain dissolved oxygen levels and water temperatures sufficient for upstream migrating adult fall-run chinook salmon.</p>	<p>E010605</p>	<p>Operate a fully operational barrier at the head of Old River in the period from August through November.</p>
		<p>Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: this target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)</p>	<p>E010606</p>	<p>Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.</p>
		<p>Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: this target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)</p>	<p>E010607</p>	<p>Reduce flow constrictions in Yolo Bypass such as openings in the railway causeway that parallels Interstate 80.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010401	Convert leveed lands to tidal wetland/slough complexes in the North Delta Ecological Unit. Permanently convert island tracts (Little Holland, Liberty, and Prospect) at the south end of the Yolo Bypass to tidal wetlands/slough complexes. Convert small tracts along Snodgrass Slough to tidal wetland/slough complexes. Construct setback levees along Minor, Steamboat, Oxford, and Elk Sloughs.
			E010402	In the East Delta Ecological Unit, construct setback levees along the South Mokelumne River and connecting dead-end sloughs (Beaver, Hog, and Sycamore).
			E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.
			E010404	Remove levees that inhibit tidal and floodflows in the headwater basins of east Delta dead-end sloughs (Beaver, Hog, and Sycamore) and allow these lands to be subject to flood overflow and tidal action.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010405	Construct setback levees in the South Delta Ecological Unit along the San Joaquin River between Mossdale and Stockton.
			E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
			E010407	Construct setback levees on corners of Delta islands along the San Joaquin River channel in the Central and West Delta Ecological Unit. Open levied lands to tidal action where possible along the margins of West Delta Ecological Unit.
		Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.	E010901	Restore 500 acres of shallow-water habitat at Prospect Island in the North Delta Ecological Unit.
			E010902	Restore 1,000 acres of shallow-water habitat in the downstream (south) end of the Yolo Bypass (Little Holland and Liberty Island) within the North Delta Ecological Unit.

Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E010903	Restore 1,000 acres of shallow-water habitat at the eastern edge of the East Delta Ecological Unit where existing land elevations range from 5 to 9 feet below mean sea level.
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento -San Joaquin Delta	Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.	E010904	Restore 2,000 acres of shallow-water habitat at the south and eastern edge of the South Delta Ecological Unit where existing land elevations range from 5 to 9 feet below mean sea level.
			E010905	Restore 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit where existing land elevations range from 5-9 feet below mean sea level. A program of fill placement or longer term subsidence reversal may be needed to accomplish this action.
		Restore 500 acres of shoals in the western-most portion of the Central and West Delta.	E010906	Implement a sediment management program which results in deposition and accretion within portions of Central and West Delta channels and bays, forming 500 acres of shallow shoal habitat restored to tidal influence.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Manage existing and restored dead-end and open-ended sloughs and channels within the Sacramento-San Joaquin Delta Ecological Zone so that the total surface area of these sloughs and channels covered by invasive non-native aquatic plants is reduced.	E015201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-ended sloughs and channels within each of the Delta's ecological units 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.
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento -San Joaquin Delta	Reduce the potential for introducing non-native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current state border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010401	Convert leveed lands to tidal wetland/slough complexes in the North Delta Ecological Unit. Permanently convert island tracts (Little Holland, Liberty, and Prospect) at the south end of the Yolo Bypass to tidal wetlands/slough complexes. Convert small tracts along Snodgrass Slough to tidal wetland/slough complexes. Construct setback levees along Minor, Steamboat, Oxford, and Elk Sloughs.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E010402	In the East Delta Ecological Unit, construct setback levees along the South Mokelumne River and connecting dead-end sloughs (Beaver, Hog, and Sycamore).
			E010404	Remove levees that inhibit tidal and floodflows in the headwater basins of east Delta dead-end sloughs (Beaver, Hog, and Sycamore) and allow these lands to be subject to flood overflow and tidal action.
			E010405	Construct setback levees in the South Delta Ecological Unit along the San Joaquin River between Mossdale and Stockton.
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of leveed lands into the active floodplain of the Delta.	E010407	Construct setback levees on corners of Delta islands along the San Joaquin River channel in the Central and West Delta Ecological Unit. Open leveed lands to tidal action where possible along the margins of West Delta Ecological Unit.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: this target is in addition to targets and programmatic actions presented in the Delta Slough habitat section.)	E010606	Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.
		Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50% to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs (less than 50 to 75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011101	To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat; in both the North Delta and East Delta Ecological Units, the short-term solution is to restore 10 miles of slough habitat and the long-term solution is to restore 30 miles of slough habitat; and in the South Delta Ecological Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	Sacramento -San Joaquin Delta	Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50% to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs (less than 50 to 75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011102	Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20 to 30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.
		Maintain existing channel islands and restore 50 to 200 acres of high value islands in selected sloughs and channels in each of the Delta's ecological units.	E011201	Actively protect and improve existing channel islands in the Delta.
			E011202	Restore 50 to 200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.
		Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000 to 45,000 acres of lands designated for floodplain restoration.	E011401	Develop tidal freshwater marshes in the North Delta Ecological Management Unit.
			E011402	Develop tidal freshwater marshes on small tracts of converted leveed lands along Snodgrass Slough.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E011403	Develop tidal freshwater marshes along the upper ends of dead-end sloughs in the east Delta.
			E011404	Develop tidal freshwater marshes along all setback levees and levees with restored riparian habitat.
E8. Restoration of 30,000 to 45,000 acres of tidal fresh emergent wetland.	Sacramento -San Joaquin Delta	Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000 to 45,000 acres of lands designated for floodplain restoration.	E011405	Develop tidal freshwater marshes on restored channel island habitat.
		Reduce the potential for introducing non-native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current state border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.
E9. Maintenance of existing and restoration of 200-800 acres of channel islands and associated habitats.	Sacramento -San Joaquin Delta	Maintain existing channel islands and restore 50 to 200 acres of high value islands in selected sloughs and channels in each of the Delta's ecological units.	E011201	Actively protect and improve existing channel islands in the Delta.
			E011202	Restore 50 to 200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (<3 meters mean high water) except where it is needed to restore flood conveyance capacity.	E015002	Restrict or minimize effects of dredging activities near existing midchannel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision (cutting).
		Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016001	In the Central and West Delta Ecological Unit, establish and enforce no wake zones of 1 to 3 miles in Disappointment Slough, 1 to 2 miles in White Slough, and 3 to 4 miles in Middle and Old Rivers in areas with remnant berms and midchannel islands.
E9. Maintenance of existing and restoration of 200-800 acres of channel islands and associated habitats.	Sacramento -San Joaquin Delta	Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016002	In the East Delta Ecological Unit, establish and enforce no wake zones of 1 to 3 miles of the Mokelumne River, 2 to 4 miles in Snodgrass Slough, and 3 to 4 miles in Beaver, Hog, and Sycamore Sloughs in areas with remnant berms and midchannel islands.
E10a. Restoration of 85-190 miles of tidal sloughs.	Sacramento -San Joaquin Delta	Manage existing and restored dead-end and open-ended sloughs and channels within the Sacramento-San Joaquin Delta Ecological Zone so that the total surface area of these sloughs and channels covered by invasive non-native aquatic plants is reduced.	E015201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-ended sloughs and channels within each of the Delta's ecological units so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-aquatic plants within 10 years.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Reduce the potential for introducing non-native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current state border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrillia.
E10a. Restoration of 85-190 miles of tidal sloughs.	Sacramento -San Joaquin Delta	Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50 to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs (less than 50 to 75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011101	To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat; in both the North Delta and East Delta Ecological Units, the short-term solution is to restore 10 miles of slough habitat and the long-term solution is to restore 30 miles of slough habitat; and in the South Delta Ecological Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E011102	Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20 to 30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
		Develop 500 acres of deep open-water areas (more than 4 to 6 feet deep) within restored fresh emergent wetland habitats in the Delta to provide resting habitat for water birds, foraging habitat for diving ducks and other water birds and semi-aquatic mammals that feed in deep water, and habitat for associated resident pond fish species.	E011001	Develop 100 acres of open-water areas within restored fresh emergent wetland habitats in the West and Central Delta Ecological Unit such as on Twitchell or Sherman islands.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E011002	Develop 200 acres of open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit.
			E011003	Develop 200 acres of open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit.
		Develop 2,100 acres of shallow, open-water areas (less than 4 to 6 feet deep) in restored fresh emergent wetland habitat areas in the Delta to provide resting, foraging, and brood habitat for water birds and habitat for fish and aquatic plants and semi-aquatic animals.	E011004	Develop 500 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the Central and West Delta Ecological Unit such as on Twitchell or Sherman Islands.
			E011005	Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit.
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento -San Joaquin Delta	Develop 2,100 acres of shallow, open-water areas (less than 4 to 6 feet deep) in restored fresh emergent wetland habitat areas in the Delta to provide resting, foraging, and brood habitat for water birds and habitat for fish and aquatic plants and semi-aquatic animals.	E011006	Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit.
			E011007	Develop 1,000 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the North Delta Ecological Unit.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore a total of 3,000 acres of nontidal freshwater marshes in the North and the East Delta Ecological Management Units; restore 4,000 acres of nontidal fresh emergent wetland in the South Delta Ecological Management Unit as part of a subsidence control program; and restore 10,000 acres of nontidal fresh emergent wetland in the Central and West Delta Ecological Management Unit as part of a subsidence control program.	E011301	Restore 1,000 acres of nontidal fresh emergent wetland on Twitchell Island.
			E011302	Restore 1,000 acres of nontidal emergent wetland in the Yolo Bypass.
			E011303	Restore 1,000 acres of nontidal emergent wetlands in levied lands designated for floodplain overflow adjacent to the dead-end sloughs in the East Delta Ecological Unit.
			E011304	Restore 4,000 acres of nontidal emergent wetlands in the South Delta in lands designated for floodplain overflow.
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento -San Joaquin Delta	Restore a total of 3,000 acres of nontidal freshwater marshes in the North and the East Delta Ecological Management Units; restore 4,000 acres of nontidal fresh emergent wetland in the South Delta Ecological Management Unit as part of a subsidence control program; and restore 10,000 acres of nontidal fresh emergent wetland in the Central and West Delta Ecological Management Unit as part of a subsidence control program.	E011305	Restore 10,000 acres of nontidal wetlands on Delta Islands of the Central and West Delta Ecological Unit.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento -San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.
			E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
		Restore and manage at least 4,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the North Delta Ecological Unit.	E011501	Improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Yolo Bypass.
			E011502	Restore and manage 2,000 acres of additional seasonal wetland habitat in association with the Yolo Bypass Wildlife Area.
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento -San Joaquin Delta	Restore and manage at least 6,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the East Delta Ecological Management Unit.	E011503	Develop a cooperative program to restore and manage 1,000 acres of additional seasonal wetland habitat on Canal Ranch.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E011504	Develop a cooperative program to restore and manage 5,000 acres of additional seasonal wetland habitat.
			E011505	Improve management of 1,000 acres of existing degraded seasonal wetland habitat.
		Restore and manage at least 8,000 acres of additional seasonal wetland habitat and improve management of 1,500 acres of existing, degraded seasonal wetland habitat in the Central and West Delta Ecological Unit.	E011506	Restore and manage 4,000 acres of additional seasonal wetland habitat on both Twitchell Island.
			E011507	Restore and manage 4,000 acres of additional seasonal wetland habitat on Sherman Island.
			E011508	Develop a cooperative program to improve management of 1,500 acres of existing degraded seasonal wetland habitat.
		Restore and manage at least 12,000 acres of additional seasonal wetland habitat and improve management of 500 acres of existing, degraded seasonal wetland habitat in the South Delta Ecological Unit.	E011509	Develop a cooperative program to restore and manage 12,000 acres of additional seasonal wetland habitat.
			E011510	Develop a cooperative program to improve management of 500 acres of existing degraded seasonal wetland habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento -San Joaquin Delta	Increase populations of amphibians particularly tiger salamanders and spadefoot toads by increasing natural flood plains, stream meander, seasonal pools, and perennial grasslands.	E017201	Restore at least five core areas of suitable habitat, each consisting of about 500 acres in each of the ecological management units.
			E017202	Enhance existing poor habitats and restore new habitats in historical wetlands, grasslands, and upland areas.
E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento -San Joaquin Delta	More frequently achieve mean daily water temperatures between 60 F and 65 F in the Delta channels in spring and fall to meet the temperature needs of salmon and steelhead migrating through or rearing in the Delta.	E010501	Improve riparian (bankside) woodland habitats along migrating channels and sloughs of the Delta.
			E010502	Improve SRA habitat along migration routes in Delta.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.</p>	<p>Sacramento -San Joaquin Delta</p>	<p>Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: this target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)</p>	<p>E010606</p>	<p>Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.</p>
		<p>Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50 to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs (less</p>	<p>E011101</p>	<p>To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat. The long-term solution is to restore 50 miles of slough habitat. In both the North Delta and East Delta Ecological Management Units, the short-term solution is to restore 10 miles of slough habitat. The long-term solution is to restore 30 miles of slough habitat. In the South Delta Ecological management Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.</p>	<p>Sacramento -San Joaquin Delta</p>	<p>Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50% to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs (less than 50 to 75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)</p>	<p>E011102</p>	<p>Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20 to 30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.</p>
		<p>Maintain existing channel islands and restore 50 to 200 acres of high value islands in selected sloughs and channels in each of the Delta's ecological units.</p>	<p>E011201</p>	<p>Actively protect and improve existing channel islands in the Delta.</p>
			<p>E011202</p>	<p>Restore 50 to 200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.</p>
		<p>Restore 10 to 20 linear miles of riparian and riverine aquatic habitat along the San Joaquin River in the South Delta Ecological Unit to create corridors of riparian vegetation of which 50% is greater than 75 feet wide and 40% is no less than 300 feet wide and 1 mile in length.</p>	<p>E011601</p>	<p>Develop a cooperative program to restore riparian habitat by obtaining conservation easements or by purchase from willing sellers.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.</p>	<p>Sacramento -San Joaquin Delta</p>	<p>Restore 15 to 25 linear miles of riparian and riverine aquatic habitat along other Delta island levees throughout the South Delta Ecological Unit to create corridors of riparian vegetation of which 60% is more than 75 feet wide, with 10% no less than 300 feet wide and 1 mile long.</p>	<p>E011602</p>	<p>Develop a cooperative program to restore riparian habitat by obtaining conservation easements or by purchase from willing sellers.</p>
		<p>Restore 10 to 15 linear miles of riparian and riverine aquatic habitat along the Sacramento River below Sacramento of which 40% is to be more than 75 feet wide and 20% over 300 feet wide.</p>	<p>E011603</p>	<p>Obtain conservation easements for, or purchase from willing sellers, land needed to restore 10 to15 linear miles of riparian habitat along the Sacramento River in the North Delta Ecological Unit. Obtain conservation easements for, or purchase from willing sellers, land needed to create corridors of riparian vegetation.</p>
		<p>Restore 8 to 15 linear miles of riparian and riverine aquatic habitat in the East Delta Ecological Unit of which 40% is to be more than 75 feet wide and 20% over 300 feet wide.</p>	<p>E011604</p>	<p>Obtain conservation easements for, or purchase from willing sellers, land needed to restore 5 to10 linear miles along the Mokelumne River and 3 to 5 miles along the Cosumnes River in the East Delta Ecological Unit to create corridors of riparian vegetation.</p>
		<p>Restore or plant riparian and riverine aquatic habitats in association with actions to recreate slough habitat and set back levees.</p>	<p>E011605</p>	<p>Obtain conservation easements for, or purchase from willing sellers, land needed to restore riparian habitat along newly created sloughs and sloughs with new levee setbacks.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento -San Joaquin Delta	Restore or plant riparian and riverine aquatic habitats in association with actions to recreate slough habitat and set back levees.	E011606	Obtain conservation easements for, or purchase from willing sellers, land needed to restore riparian habitat along new or upgraded Delta levees.
		Protect existing riparian woodlands in North, East, and South Delta Ecological Units.	E011607	Expand the Stone Lakes and Cosumnes River Preserves from their current size by an additional 500 acres of existing woodland habitat. Share costs with the Nature Conservancy to acquire in fee-title the lands needed from willing landowners.
			E011608	Purchase riparian woodland property or easements.
		Restore 10 to 20 linear miles of riparian and riverine aquatic habitat in the North Delta Ecological Management Unit of which 40% is to be more than 75 feet wide and 20% over 300 feet wide.	E011609	Obtain conservation easements from willing sellers, land needed to restore 5-10 linear miles along Steamboat Slough as part of the development of a North Delta habitat corridor.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Increase shoreline and floodplain riparian habitat in the Delta by modifying current vegetation maintenance practices on both the water and land side of berms on 25 to 75 miles of the Sacramento, Mokelumne, and San Joaquin Rivers, and on 25 to 100 miles of other Delta channels and sloughs confined by levees.	E014901	Enter into agreements with willing levee reclamation districts to implement modified levee and berm vegetation management practices that promote establishment and maturation of shoreline riparian vegetation to restore and maintain the health of aquatic resources in and dependent on the Delta. Reimburse districts for any additional maintenance and inspection costs.
E15a. Restoration of 48–85 miles of riparian habitat along channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento -San Joaquin Delta	Reduce surface area covered by non-native plants to less than 1%.	E015301	Control non-native riparian plants.
		Reduce the aerial extent of invasive non-native woody species, such as Giant Reed (i.e., arundo or false bamboo) and eucalyptus, that compete with native riparian vegetation by reducing the aerial extent of non-natives by 50% throughout the Delta and eradicating invasive woody plants from restoration areas.	E015302	Implement a program throughout the Delta to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation by reducing the aerial extent of species such as False Bamboo, eucalyptus, and non-native cordgrass by 50%.
			E015303	Implement a program throughout the Delta that, prior to taking restoration actions, eliminates invasive woody plants, which could interfere with the restoration of native riparian vegetation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E16a. Restoration of 4,000-6,000 acres of perennial grassland.	Sacramento -San Joaquin Delta	Restore 4,000 to 6,000 acres of perennial grasses in the North, East, South, and Central and West Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	E011801	Develop a cooperative program to restore 1,000 acres of perennial grassland in the North Delta Ecological Unit through conservation easement or purchase from willing sellers.
			E011802	Develop a cooperative program to restore 1,000 acres of perennial grassland in the East Delta Ecological Unit through conservation easement or purchase from willing sellers.
			E011803	Develop a cooperative program to restore 1,000 to 2,000 acres of perennial grassland in the South Delta Ecological Unit through either conservation easement or purchase from willing sellers.
E16a. Restoration of 4,000-6,000 acres of perennial grassland.	Sacramento -San Joaquin Delta	Restore 4,000 to 6,000 acres of perennial grasses in the North, East, South, and Central and West Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	E011804	Develop a cooperative program to restore 1,000 to 2,000 acres of perennial grassland in the Central and West Delta Ecological Unit through either conservation easements or purchase from willing sellers.
		Increase populations of amphibians particularly tiger salamanders and spadefoot toads by increasing natural flood plains, stream meander, seasonal pools, and perennial grasslands.	E017201	Restore at least five core areas of suitable habitat, each consisting of about 500 acres in each of the ecological management units.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E017202	Enhance existing poor habitats and restore new habitats in historical wetlands, grasslands, and upland areas.
E17. Protection and enhancement of 50-100 acres of inland dune scrub.	Sacramento -San Joaquin Delta	Enhance 50 to100 acres of low- to moderate-quality Antioch inland dune scrub habitat in the Delta to provide high-quality habitat for special-status plant and animal species and other associated wildlife populations.	E011701	Support programs for protecting and restoring inland dune scrub habitat at existing ecological preserves in the Central and West Delta Ecological Unit.
			E011702	Protect and restore inland dune scrub habitat areas adjacent to existing ecological preserves in the Central and West Delta Ecological Unit through conservation easements or purchase from willing sellers.
E18a. Cooperative management of 40,000-75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Sacramento -San Joaquin Delta	Cooperatively manage 40,000 to 75,000 acres of agricultural lands.	E011901	Increase the area of Delta corn fields and pastures flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
E18a. Cooperative management of 40,000-75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Sacramento -San Joaquin Delta	Cooperatively manage 40,000 to 75,000 acres of agricultural lands.	E011902	Periodically flood pasture from October-March in portions of the Delta relatively free of human disturbance to create suitable roosting habitat for wintering greater sandhill crane, and other wintering sandhill crane subspecies.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E011903	Create permanent or semipermanent ponds in farmed areas of the Delta that provide suitable waterfowl nesting habitat, but lack suitable brooding habitat, to increase resident dabbling duck production.
			E011904	Increase the acreage farmed for wheat and other crop types that provide suitable nesting habitat for waterfowl and other ground nesting species in the Delta.
			E011905	Convert agricultural lands in the Delta that are farmed from crop types that have relatively low forage value for wintering waterfowl, wintering sandhill cranes, and other wildlife to production of crop types that provide greater forage value.
			E011906	Defer fall tillage on corn fields in the Delta to increase the available forage for wintering waterfowl, wintering sandhill cranes, and associated wildlife.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18a. Cooperative management of 40,000-75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Sacramento -San Joaquin Delta	Cooperatively manage 40,000 to 75,000 acres of agricultural lands.	E011907	Develop a cooperative program to improve management on 8,000 acres of corn and wheat fields in the Delta and to reimburse farmers for leaving a portion of the crop in each field unharvested to provide forage for waterfowl, sandhill cranes, and other wildlife.
		Maintain present populations with no further declines in size by ensuring that waterways known to be used by giant garter snakes have water in them year around.	E007101	Maintain existing natural habitats that have available water all year and identify key habitats in agricultural areas for special management.
E19. Restoration of flood refuge habitat areas for wildlife along levees and other lands adjacent to existing and restored habitat areas.	Sacramento -San Joaquin Delta	Increase the populations and distribution of upland game.	E014401	Provide high ground adjacent to current and expanded habitat with cover for protection from floods. Existing flood control levees adjacent to agricultural lands could be utilized for this escape habitat in this area to provide sufficient vegetative growth of grasses, forbs, and shrubs to lower predation pressure during these times and when adjacent lands are fallow.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	Sacramento -San Joaquin Delta	Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (<3 meters mean high water) except where it is needed to restore flood conveyance capacity.	E015001	Use alternate sources (rather than Delta inchannel sources) of levee maintenance material, such as excavation of abandoned nonessential levees, excavation material from the restoration of secondary tidal channels, dry-side island interior borrow pits, upland borrow sites, Cache Creek settling basin and Yolo Bypass sediment deposits, and deep water dredging sites in the San Francisco Bay.
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	Sacramento -San Joaquin Delta	Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (<3 meters mean high water) except where it is needed to restore flood conveyance capacity.	E015002	Restrict or minimize effects of dredging activities near existing midchannel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision (cutting).
		Avoid dredging during spawning and rearing periods for delta smelt and rearing periods for winter-run chinook salmon.	E015003	Follow DFG guidelines for dredging in the estuary.
			E015004	Provide stockpiles of levee maintenance materials in three or more selected land side areas to avoid the need to obtain material from Delta channels during restricted periods.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	Sacramento -San Joaquin Delta	Reduce or eliminate the influx of non-native aquatic species in ship ballast water.	E015401	Fund additional inspection staff to enforce existing regulations.
			E015402	Help fund research on ballast water treatment techniques, which could eliminate non-native species before ballast water is released.
		Reduce the potential for introducing non-native aquatic organisms at border crossings.	E015403	Provide funding to the California Department of Food and Agriculture to expand the current State border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel.
E22. Reduction in the adverse effects of diversions on fish.	Sacramento -San Joaquin Delta	Reduce loss of important fish species at diversions.	E014701	Consolidate and screen agricultural diversions in the Delta.
E22. Reduction in the adverse effects of diversions on fish.	Sacramento -San Joaquin Delta	Reduce loss of important fish species at diversions.	E014702	Replace or upgrade the screens at the SWP and CVP intakes with positive barrier, fish bypass screens and state-of-the-art fish holding and transportation systems.
			E014703	Upgrade screens at Pacific Gas & Electric Company's Contra Costa power plant with fine-mesh, positive barrier, fish bypass screens.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Sacramento -San Joaquin Delta	Reduce illegal harvest of anadromous fish and wildlife in the Delta by increasing enforcement effort.	E015801	Provide additional funding to the DFG for additional enforcement.
			E015802	Provide additional funding to the local county sheriff's departments and State and local park agencies to support additional enforcement efforts.
			E015803	Provide rewards for the arrest and conviction of poachers of fish and wildlife.
E27a. Reduction in the concentrations and loadings of contaminants in the aquatic environment by 25%-50%.	Sacramento -San Joaquin Delta	Reduce loading, concentrations, and bioaccumulation of contaminants of concern to ecosystem health in the water, sediments, and tissues of fish and wildlife in the Sacramento-San Joaquin Delta Ecological Zone by 25 to 50% as measured against current average levels.	E015701	Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Delta by modifying land management practices and chemical dependency on 50,000 acres of urban and agricultural lands that drain untreated into Delta channels and sloughs. Actions will focus on modifying agricultural practices and urban land uses on a large scale basis. To reduce the concentration of pesticide residues, the amount applied will be reduced and the amount of pesticide load reaching the Delta's aquatic habitats will be further reduced by taking advantage of biological and chemical processes within wetland systems, which can help break down harmful pesticide residues.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E015702	Reduce levels of hydrocarbons and other contaminants entering the Delta foodweb from elevated releases into the estuary at oil refineries.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Sacramento -San Joaquin Delta	Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016001	In the Central and West Delta Ecological Unit, establish and enforce no wake zones of 1 to 3 miles in Disappointment Slough, 1 to 2 miles in White Slough, and 3 to 4 miles in Middle and Old Rivers in areas with remnant berms and midchannel islands.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Sacramento -San Joaquin Delta	Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016002	In the East Delta Ecological Unit, establish and enforce no wake zones of 1 to 3 miles of the Mokelumne River, 2 to 4 miles in Snodgrass Slough, and 3 to 4 miles in Beaver, Hog, and Sycamore Sloughs in areas with remnant berms and midchannel islands.
		Reduce boat wakes near designated important California black rail nesting areas in the Delta from March to June to levels necessary to prevent destruction of nests to assist in recovery of this listed species.	E016003	Establish and enforce no wake zones within 50 yards of important California black rail nesting areas in the Delta from March to June.
			E016004	Establish and enforce no motorized boating zones in 5 to 25 miles of existing dead-end channels in the Delta from March to June.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E016005	Establish and enforce no motorized boating zones in the small tidal channels created in restored tidal fresh emergent wetlands and Delta floodplains of levee setbacks.
		Reduce boat wakes near important shallow water spawning areas in the Delta from March to June to levels necessary to protect successful spawning behavior and success. This will help in the recovery of listed species.	E016006	Identify important shallow water spawning areas and establish and enforce no wake zones within 50 yards of these important Delta habitats from March to June.
E31. Establish additional populations of Sacramento perch.	Sacramento -San Joaquin Delta	Evaluate the status and biology of the Sacramento perch to determine if restoration of wild populations within its native range is feasible.	E017001	Complete a thorough status review of the Sacramento perch and develop a plan for its long-term preservation in the Central Valley. Establish at least one population in the Delta.
Levee System Integrity Program ¹				
L1. Improvement and maintenance of Delta levees.	Sacramento -San Joaquin Delta	Improve Delta levee system stability to meet PL 84-99 criteria.	L010101	Modify levee cross sections by raising levee height, widening levee crown, flattening levee slopes, and/or constructing stability berms.
		Maintain Delta levees to the PL 84-99 standard.	L010102	Develop a long term maintenance plan.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Improve levee stability in key Delta locations to a level commensurate with the benefits which the levees protect.	L010201	Modify levee cross sections by raising levee height, widening levee crown, flattening levee slopes, and/or constructing stability berms in key Delta locations.
		Maintain improved levees.	L010202	Develop long term maintenance plan.
		Develop the capability to efficiently respond to multiple concurrent levee breaks within the Delta.	L010301	Implement a comprehensive reconstruction, repair, and maintenance program for Delta levees so that a viable Delta levee industry can be reestablished, with a fleet of specialized equipment.
L2. Reduction in the risk to levee stability from subsidence.	Sacramento -San Joaquin Delta	Reduce, eliminate, or reverse subsidence adjacent to affected levees.	L010401	Implement current BMPs to correct subsidence effects on levees.
			L010402	Fund grant projects to develop BMP's that address levee subsidence.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Quality Program ¹				
Q1 Reduction of oxygen-depleting substances in the aquatic environment.	Sacramento-San Joaquin Delta	Eliminate occurrences of dissolved oxygen concentrations below 5 mg/l throughout the water column; reduce the impairment or blockage of fish migration past Stockton; reduce occurrence of algal blooms; reduce stress to fish due to low dissolved oxygen concentration near Stockton; and eliminate fish kills near Stockton. Performance of all these measures can be determined by appropriate monitoring programs.	Q010101	Require continued reduction of oxygen depleting substances from the RWCF, the Port of Stockton and other NPDES and Waste Discharge Requirement permittees in order to improve water quality during Chinook salmon migration.
			Q010102	Provide technical and financial assistance and regulatory incentives for implementing Best Management Practices (BMPs) to control oxygen depletion.
			Q010103	Possible management actions include physical mixing or other methods to decrease stratification and increase aeration in the Ship Channel and Turning Basin during periods of low dissolved oxygen, changing effluent discharge location, changing the channel
		Have dissolved oxygen concentrations above the 5 mg/l standard, BOD concentrations below 30 mg/l, and natural ecosystem processes and functions restored in the creeks.	Q010104	There should be further effort to enforce the waste discharge restrictions of permitted and unpermitted dischargers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Sacramento-San Joaquin Delta	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q010201	Manage restoration projects to minimize adverse impacts and maximize benefits for drinking water quality.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Sacramento-San Joaquin Delta	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q010202	Minimize pathogens from recreational boating.
			Q010203	Develop and implement watershed management programs for Clifton Court and Bethany Reservoir to address nutrients and pathogens.
			Q010204	Control wastewater discharges from Discovery Bay outfall.
			Q010205	Relocation, reduction, or elimination of agricultural drainage into Rock Slough.
			Q010206	Relocate the Tracy intake to avoid wastewater treatment plant effluent.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	Sacramento-San Joaquin Delta	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q010501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Sacramento-San Joaquin Delta	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q010801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Water Use Efficiency Program ¹				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	Sacramento-San Joaquin Delta	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	Sacramento-San Joaquin Delta	None.	None.	None.
W3. Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies.	Sacramento-San Joaquin Delta	None.	None.	None.
W4. Support development and implementation of water recycling projects.	Sacramento-San Joaquin Delta	None.	None.	None.
Water Transfer Program ¹				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	Sacramento-San Joaquin Delta	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Watershed Management Program ¹				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	Sacramento-San Joaquin Delta	None.	None.	None.
Conveyance Program				
C1. Construct and operate modifications to existing south Delta conveyance features.	Sacramento-San Joaquin Delta	None.	C010101	Extend operation of The Temporary Barriers Program.
			C010102	Modify SWP operating rules to all export pumping up to the current physical capacity of SWP export facilities (approximately 8,500 cfs) within the constraints of the 1995 Water Quality Control Plan.
			C010103	Construct a new screened intake at Clifton Court Forebay that allows diversion of up to 10,300 cfs throughout the tidal cycle. This would include new fish salvage facilities and other ancillary facilities.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
C1. Construct and operate modifications to existing south Delta conveyance features.	Sacramento-San Joaquin Delta	None.	C010104	Construct either a new screened intake at the head of the channel leading to the CVP pumping plant at Tracy or expand the proposed new diversion at Clifton Court Forebay with a new intertie to the Tracy Pumping Plant. These facilities would be screened and sized to meet the full export capacity of the Tracy pumps (4,600 cfs).
			C010105	Construct an intertie to allow up to 400 cfs of pumping from the CVP Delta Mendota Canal to the SWP California Aqueduct.
			C010106	Construct an intertie connecting the Tracy Pumping Plant to Clifton Court Forebay.
			C010107	Construct an operable barrier at the head of Old River to improve salmon survival.
			C010108	Construct up to 3 additional operable barriers in the South Delta and implement limited dredging to address problems that may be associated with export operations.
C2. Construct and operate modifications to existing north Delta conveyance features.	Sacramento-San Joaquin Delta	None.	C020101	Develop operational criteria for the Delta Cross Channel that balances flood control, water quality, water supply reliability, and fisheries concerns.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			C020102	Evaluate if a 2,000 cfs screened diversion from Hood to the Mokelumne River to improve or maintain central Delta water quality is feasible.
C2. Construct and operate modifications to existing north Delta conveyance features.	Sacramento-San Joaquin Delta	None.	C020103	Evaluate the feasibility of implementing setback levees and/or channel dredging along the Mokelumne River from Interstate 5 downstream to the San Joaquin River to improve conveyance and flood control.
C3 Construct and operate an isolated conveyance facility from the Sacramento River along the eastern side of the Delta to Clifton Court Forebay.	Sacramento-San Joaquin Delta	None.	C030101	Evaluate the need and feasibility for an isolated conveyance facility from the Sacramento River to the SWP and CVP export facilities in the South Delta. Capacities would range from 5,000 to 15,000 cfs.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Storage Facilities Program				
S1. Construct and operate enlarged or new surface storage facilities.	Sacramento-San Joaquin Delta	None.	None.	None.
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	Sacramento-San Joaquin Delta	None.	None.	None.
02. Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits.	Sacramento-San Joaquin Delta	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program¹				
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Suisun Marsh\North San Francisco Bay	More closely emulate the natural pattern of seasonal freshwater inflow to North San Francisco Bay to transport sediments; allow upstream and downstream fish passage; contribute to riparian vegetation succession; permit transport of larval fish to the entrapment zone; maintain the entrapment zone in Suisun Bay; and provide adequate attraction flows for upstream, through-Bay migrating salmon. Delta outflow in dry and normal years will be improved by coordinating releases and natural flows in the Sacramento River Basin to provide a March flow event of at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below-normal years, and at least 40,000 cfs for 10 days in above-normal years. The existing smaller, late-April and early-May flow event will be improved with additional releases of water from San Joaquin River and Delta tributaries to provide flows of magnitudes and durations similar to those prescribed for March.	E020101	Develop a cooperative program to provide target flows in dry and normal years by allowing inflows to major storage reservoirs prescribed in the visions of upstream ecological zones to pass downstream into and through the Delta. (This action would result from an accumulation of recommendations for spring flow events and minimum flows from upstream ecological zones.)
E5b. Restoration of at least 1,500 acres of tidal shallow-water habitat.	Suisun Marsh\North San Francisco Bay	Expand the floodplain area in the Napa River, Sonoma Creek, and Petaluma River ecological management units by putting approximately 10% of levied lands into the active floodplain.	E020401	Convert levied lands to tidal wetland/slough complexes.
E5b. Restoration of at least 1,500 acres of tidal shallow-water habitat.	Suisun Marsh\North San Francisco Bay	Restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit	E020901	Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.
		Manage existing and restored dead-end and open-end sloughs and channels within the ecological zone so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants.	E025201	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.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh\North San Francisco Bay	Expand the floodplain area in the Napa River, Sonoma Creek, and Petaluma River by putting approximately 10% of levied lands into the active floodplain.	E020401	Convert levied lands to tidal wetland/slough complexes.
		Restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit	E020901	Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh\North San Francisco Bay	Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore tidal action to 5,000 to 7,000 acres in the Suisun Bay and Marsh Ecological Unit; 1,000 to 2,000 acres in the Napa River Ecological Unit; 500 to 1,000 acres each in the Sonoma Creek, Petaluma River, and San Pablo Bay Ecological Units.	E027301	Develop a cooperative program 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.
		Protect 6,200 acres of existing saline emergent wetlands in the Suisun Bay and Marsh Ecological Management Unit.	E027302	Develop a cooperative program to acquire, in fee-title or through a conservation easement, existing wetlands subject to tidal action.
		Restore full tidal action to muted marsh areas along the north shore of the Contra Costa shoreline.	E027303	Develop a cooperative program to evaluate, acquire, in fee-title or through a conservation easement, and restore existing muted wetlands subject to tidal action.
		Increase the population of breeding pairs of Suisun song sparrow between 70 and 100 percent compared to existing population estimates of 6,000.	E023904	Establish additional and protect existing dispersal corridors of suitable tidal brackish marsh along the banks of tidal sloughs.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh\North San Francisco Bay	Increase the population of breeding pairs of Suisun song sparrow between 70 and 100 percent compared to existing population estimates of 6,000.	E023903	Maintenance activities should be conducted to minimize disturbance to tidal brackish marsh vegetation and should not disturb breeding adults.
			E023904	Restore tidal habitat as specified for tidal saline emergent wetland in appropriate areas with particular emphasis on expanding existing fragments of habitat to expand the number of known nesting territories in the Suisun Marsh by 200 percent.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Increase the existing population of salt marsh harvest mouse by 100%.	E027401	Restore high tidal marsh habitats in proximity to upland habitats consistent with the recovery plan for this species.
		Identify the remaining populations of Suisun ornate shrew and develop a conservation plan to stop the decline of this species.	E027501	Identify all remaining populations of Suisun ornate shrew and develop and implement protection/restoration plans.
		Determine the distribution and taxonomic status of the San Pablo California vole while maintaining existing salt marsh habitat know to support populations.	E027601	Undertake wetland restoration projects in and adjacent to known populations to increase available habitat.
		Manage existing and restored dead-end and open-end sloughs and channels within the ecological zone so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants.	E025201	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.
E10b. Restoration of 35-70 miles of tidal sloughs.	Suisun Marsh\North San Francisco Bay	Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E12. Restoration of up to 1,600 acres of nontidal deep open-water habitat adjacent to existing and restored wetlands.	Suisun Marsh\North San Francisco Bay	Develop 1,600 acres of deeper (3-6 feet deep) open-water areas to provide resting habitat for water birds, foraging habitat for diving ducks and other water birds that feed in deep water.	E021001	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas adjacent to restored saline emergent wetland habitats in the Suisun Bay and Marsh Ecological Management Unit.
			E021002	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas adjacent to restored saline emergent wetland habitats in each the Napa River, Sonoma Creek and Petaluma River Ecological Units (1,200 acres total).
E13b. Restoration of 1,000-1,500 acres of seasonal wetland and enhancement and management of 40,000-50,000 acres of existing seasonal wetlands for wildlife.	Suisun Marsh\North San Francisco Bay	Assist in protecting and enhancing 40,000 - 50,000 acres of existing degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit per the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E021501	Support the cooperative program to improve management of 26,000 acres of degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit.
E13b. Restoration of 1,000-1,500 acres of seasonal wetland and enhancement and management of 40,000-50,000 acres of existing seasonal wetlands for wildlife.	Suisun Marsh\North San Francisco Bay	Assist in protecting and enhancing 40,000 - 50,000 acres of existing degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit per the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E021502	Support the development of a cooperative program to improve management of 32,000 acres of existing seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit.
			E021503	Develop a cooperative program to acquire, in fee-title or through a conservation easement, existing farmed baylands and restore tidal action.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E14a. Protection and enhancement of up to 100 acres of vernal pools and 500-1,000 acres of surrounding lands.	Suisun Marsh\North San Francisco Bay	Protect and manage vernal pools in the Suisun Bay and Marsh Ecological Unit that provide suitable habitat for listed fairy shrimp species, the Delta green ground beetle, and special-status plant species to assist in these species' recovery. Where feasible, restore vernal pools that have been degraded by agricultural activities to provide suitable habitat for special-status invertebrates and plants and amphibian, such as the spadefoot toad, to assist in the recovery of these populations.	E021504	Develop a cooperative program to acquire 100 acres of vernal pools and 500 to 1,000 acres of adjacent buffer areas to restore a corridor the size of the Jepson Prairie Preserve in the Yolo Basin Ecological Unit.
		Expand the existing population of the delta green ground beetle and establish additional populations to remove it from the Federal threatened species list.	E026201	Increase populations of delta green ground beetle by establishing and securing habitat to support three additional viable and self-sustaining colonies of the delta green ground beetle and maintain the existing populations.
E15b. Restoration of 50-75 miles of riparian habitat along channels and reduction of populations of invasive non-native riparian plants by 50%.	Suisun Marsh\North San Francisco Bay	Restore 10 to15 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.	E021601	Coordinate with landowners and managers to restore and maintain 10 to15 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.
		Reduce by 50% the area covered by invasive non-native woody species, such as giant reed and eucalyptus, that compete with native riparian vegetation, and eradicate invasive woody plants from restoration areas.	E025301	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%.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E025302	Develop a cooperative program to eliminate invasive woody plants from restoration sites to protect native riparian vegetation.
E16b. Restoration of up to 5,000 acres of perennial grassland.	Suisun Marsh\North San Francisco Bay	Restore 1,000 acres of perennial grasses in each of the ecological units associated with existing or proposed wetlands.	E021801	Develop a cooperative program to restore perennial grasslands by acquiring conservation easements or purchasing land from willing sellers.
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	Suisun Marsh\North San Francisco Bay	Reduce or eliminate the influx of non-native aquatic species in ship ballast water.	E025401	Fund additional inspection staff to enforce existing regulations.
		Reduce the potential for influx of non-native aquatic plant and animal species at border crossings.	E025402	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.
E22. Reduction in the adverse effects of diversions on fish.	Suisun Marsh\North San Francisco Bay	Reduce entrainment losses of juvenile fish at diversions by 25 to 50% by installing positive-barrier fish screens on large diversion structures.	E024701	Develop a cooperative program to consolidate, screen, or eliminate diversions in the Suisun Marsh/North San Francisco Bay Ecological Zone.
E24. Reduction in levels of predation on juvenile anadromous fish.	Suisun Marsh\North San Francisco Bay	Limit supplementation of striped bass to life stages that minimize the rate of predation on juvenile anadromous and estuarine fish.	E025601	Provide sufficient equipment, support staff, and operation and maintenance funds to hold juvenile striped bass longer so they can be planted at 2 years of age instead of 1 year of age.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Suisun Marsh\North San Francisco Bay	Reduce illegal harvest of anadromous fish and waterfowl in Suisun Marsh and San Francisco Bay by increasing enforcement.	E025801	Provide additional funding to California Department of Fish and Game (DFG) for additional enforcement.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E025802	Provide additional funding to county sheriff's departments and State and local park agencies to support additional enforcement efforts.
			E025803	Provide rewards for the arrest and conviction of poachers.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Suisun Marsh\North San Francisco Bay	Reduce boat wakes near California clapper and black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June to prevent destruction of nests to assist in the recovery of this listed species.	E026001	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.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Suisun Marsh\North San Francisco Bay	Reduce boat wakes near California clapper and black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June to prevent destruction of nests to assist in the recovery of this listed species.	E026002	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.
			E026003	Develop a cooperative program with local agencies to establish and enforce zones prohibiting motorized boats in new, small channels in restored tidal wetlands.
E30. Enhancement of habitat conditions for the Suisun song sparrow in occupied habitat areas.	Suisun Marsh\North San Francisco Bay	Increase the population of breeding pairs of Suisun song sparrow between 70 and 100 percent compared to existing population estimates of 6,000.	E023901	Encourage the growth of upland vegetation on the upper banks of levees to provide upland cover to protect against predation during high tides and high flows.
			E023902	Establish additional and protect existing dispersal corridors of suitable tidal brackish marsh along the banks of tidal sloughs.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E023903	Maintenance activities should be conducted to minimize disturbance to tidal brackish marsh vegetation and should not disturb breeding adults.
			E023904	Restore tidal habitat as specified for tidal saline emergent wetland in appropriate areas with particular emphasis on expanding existing fragments of habitat to expand the number of known nesting territories in the Suisun Marsh by 200 percent.
Levee System Integrity Program ¹				
L3. Improvement and maintenance of Suisun Marsh levees.	Suisun Marsh\North San Francisco Bay	None.	None.	None.
Water Quality Program ¹				
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Suisun Marsh/North San Francisco Bay	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q020201	Manage restoration projects to minimize adverse impacts and maximize benefits for drinking water quality.
			Q020202	Minimize pathogens from recreational boating.
			Q020203	Implement Barker Slough Watershed Management Program

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			Q020204	Relocation of the North Bay Aqueduct intake.
Q4 Reduction of pesticide loadings in the aquatic environment.	Suisun Marsh\North San Francisco Bay	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q020501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Suisun Marsh\North San Francisco Bay	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q020801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q8 Reduction of sediment loadings to levels which do not adversely effect beneficial uses of surface water.	Suisun Marsh\North San Francisco Bay	Reduce sediment in areas to the degree that sediment does not cause negative impacts to beneficial uses of the surface water, including ecosystem benefits and municipal uses.	Q020901	Implement erosion control Best Management Practices (BMPs) on urban construction and BMPs for agricultural lands to reduce sediment in the Napa River.
Water Use Efficiency Program ¹				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	Suisun Marsh\North San Francisco Bay	None.	None.	None.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	Suisun Marsh\North San Francisco Bay	None.	None.	None.
W3. Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies.	Suisun Marsh\North San Francisco Bay	None.	None.	None.
W4. Support development and implementation of water recycling projects.	Suisun Marsh\North San Francisco Bay	None.	None.	None.
Water Transfer Program ¹				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	Suisun Marsh\North San Francisco Bay	None.	None.	None.
Watershed Management Program ¹				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	Suisun Marsh\North San Francisco Bay	None.	None.	None.

¹Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program¹				
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento River	More closely emulate the seasonal streamflow patterns in dry and normal year- types by allowing a late-winter or early-spring flow event of approximately 8,000 to 10,000 cfs in dry years and 15,000 to 20,000 cfs in below normal water-years to occur below Keswick Dam.	E030101	Provide a flow event by supplementing normal operating flows from Shasta and Keswick Dams with releases from Lake Shasta (and Trinity Lake) in March during years when no flow event has occurred during winter or is expected to occur. Flow events would be provided only when sufficient inflow to Lake Shasta is available to sustain the prescribed releases. This action can be refined by evaluating its indirect costs and the overall effectiveness of achieving objectives.
		Maintain base flows of 6,000 to 8,000 cfs during fall.	E030102	Provide flow releases from Shasta Lake and Keswick Dam when necessary to provide the target base flows. Releases would be made only when inflows equal or exceed prescribed releases.
	North Sacramento Valley	Increase flow in Cow Creek by 25 to 50 cfs, corresponding to the natural seasonal runoff pattern, and maintain 25 to 75 cfs during October.	E040101	Increase flow in Cow Creek by purchasing water from willing sellers or implementing a conjunctive groundwater program.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>North Sacramento Valley</p>	<p>Increase flow in Clear Creek to 150 to 200 cfs from October 1 to June 1 and to 100 to 150 cfs from May 31 and to 100 to 150 cfs from June 1 to September 30.</p>	<p>E040102</p>	<p>Develop a cooperative program to improve flow in Clear Creek by increasing releases from Clair Hill and Whiskeytown Dams.</p>
		<p>Augment flow in Battle Creek by 25 to 50 cfs.</p>	<p>E040103</p>	<p>Increase flow in Battle Creek by purchasing water from willing sellers or providing compensation for forgone power production. This includes negotiating and renewing an existing interim flow agreement between the Department of the Interior and PG&E, and includes a provision for the release of 10 cfs at the Asbury Pump on Baldwin Creek, a dewatered Battle Creek tributary that provides steelhead habitat. In the longer-term, this action also includes increasing flows at the Inskip Diversion Dam and South Diversion Dam.</p>
		<p>Augment flow in Bear Creek by 10 to 20 cfs.</p>	<p>E040104</p>	<p>Increase Bear Creek flow by purchasing water from willing sellers or providing alternative sources of water to diverters during important fish passage periods in spring and fall.</p>
		<p>Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Battle Creek.</p>	<p>E044701</p>	<p>Develop a cooperative approach to improve conditions for anadromous fish in Battle Creek by installing fish screens at four diversions on the North Fork, three diversions on the South Fork, and one diversion on the mainstem, or acquire water rights to eliminate the need for diversion and screening.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Cottonwood Creek	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversions on Clear Creek.	E044703	Acquire water rights on Clear Creek at the McCormick-Saeltzer Dam to eliminate the need for diversion.
		During summer and fall, more closely emulate the seasonal streamflow pattern, so that flows are sufficient for chinook salmon holding and spawning in most year types of providing up to 20 to 50 cfs. These flows can mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession.	E050101	Augment summer and fall flow in Cottonwood Creek by purchasing water from willing sellers and developing alternative supplies.
	Butte Basin	Increase spring and fall flow in Paynes Creek.	E070101	Develop a cooperative approach to increase flow in Paynes Creek by acquiring water from willing sellers or by developing alternative supplies.
		Increase flow in Antelope Creek during October 1 through June 30.	E070102	Develop a cooperative approach to increase flow in Antelope Creek by acquiring water from willing sellers or by providing alternative water supplies to diverters during the upstream and downstream migration of adult and juvenile spring- and fall-run chinook salmon and steelhead trout.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Butte Basin	Increase the flow in Mill Creek.	E070103	Develop a cooperative approach to increase flow in the lower 8 miles of Mill Creek. This involves acquiring water from willing sellers or by providing alternative water supplies to diverters during the upstream migration of adult salmon and steelhead.
		Increase flow in the lower 10 miles of Deer Creek.	E070104	Develop a cooperative approach to increase flow in the lower section of Deer Creek. This involves acquiring water from willing sellers or by providing alternative supplies during the upstream migration of adult spring-run and fall-run chinook salmon and steelhead trout.
		Increase flow in Butte Creek.	E070105	Develop a cooperative approach to increase flow in Butte Creek by acquiring water from willing sellers.
		Maintain a minimum year-round flow of 40 cfs in Butte Creek between the Centerville Diversion Dam and the Centerville Powerhouse.	E070106	Develop a cooperative program with PG&E to maintain a minimum flow in Butte Creek below the Centerville Diversion Dam.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>Feather River\Sutter Basin</p>	<p>More closely emulate the seasonal streamflow pattern in the Feather River by providing March flow events of 4,000 to 6,000 cfs in dry years, 6,000 to 8,000 cfs in below-normal years, and 8,000 to 10,000 cfs in above-normal years, and by providing or maintaining flows that mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream-channel meander and riparian vegetation succession. In addition, provide minimum flows recommended by DFG (1993). Flows will be provided only if they are less than or equal to the level of Oroville Reservoir inflow.</p>	<p>E080101</p>	<p>Develop a cooperative program to evaluate the benefits of supplemental Feather River flows to ecological processes and riparian and riverine aquatic habitats.</p>
		<p>Evaluate the potential benefits to increased salmon and steelhead production in the Feather River of releasing from Oroville Dam of 2,500 cfs during September-May and 1,100 cfs during June-August in wet and normal years, and 1,700 cfs during September-May and 800 cfs during June-August in dry years.</p>	<p>E080102</p>	<p>Develop a cooperative program to supplement flows in the Feather River with water acquired from new water supplies, water transfers, and willing sellers in accordance with applicable guidelines or negotiated agreements.</p>
		<p>Supplement flows in the Yuba River with March flow events of 2,000 to 3,000 cfs in dry years and 3,000 to 4,000 in normal years to improve conditions for all chinook salmon, steelhead, and American shad life stages. In addition, provide minimum flows recommended at Marysville by DFG (1993). Flows will be provided only if inflow to Englebright and New Bullards Bar Reservoirs is sufficient to meet the flows. Minimum streamflow recommendations for Yuba River at Marysville. (Period - Flow in All Water-Year Types): October 1-March 31: 600-700 cfs; April 1-June 30:1,000 cfs minimum; July 1-September 30: 450 cfs.</p>	<p>E080103</p>	<p>Supplement flows in the Yuba River below Englebright Dam with water acquired from new water supplies, water transfers, and willing sellers consistent with applicable guidelines, or negotiate agreements to improve conditions for all life stages of chinook salmon and steelhead to provide flows recommended by DFG (1993).</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Feather River\Sutter Basin	Supplement flows in the Bear River to improve conditions for all life stages of chinook salmon and steelhead. Provide a flow event of 300 to 500 cfs in dry years. Minimum streamflow recommendations for Bear River: (Month - Flows [cfs]): October 1-14: 100, October 15-December 15: 250, January-March: 250, April-June: 250, July-September:10.	E080104	Supplement flows in the Bear River with water acquired from new water supplies, water transfers, and willing sellers consistent with applicable guidelines, or negotiate agreements to improve conditions for all chinook salmon and steelhead life stages.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>American River Basin</p>	<p>Develop and implement an ecologically based streamflow regulation plan for the American Basin creeks and lower American River. The lower American River should meet the recommended flows and flow targets for the lower American River. Lower American river flow events should be coordinated with similar flows that occur naturally in the Sacramento Valley and with storage releases from Shasta and Oroville Reservoirs. Average monthly minimum flow targets (cfs): October wet-2,500, above and below normal-2,000, dry and critical-1,750 and critical relaxation-800; November-February wet-2,500, above and below normal-2,500, dry and critical-1,750 and critical relaxation-1,200; March-May wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-1,500; June wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-500; July wet-2,500, above and below normal-1,500, dry and critical-1,500 and critical relaxation-500; August wet-2,500, above and below normal-2,000, dry and critical-1,000, and critical relaxation-500. Average flow targets for 10-day pulse (cfs), coordinated with flows from Shasta and Oroville Reservoirs: March wet-6,00-7,000, above and below normal-4,000-5,000, dry-3,000-3,500 and exceptions-only when inflows are sufficient; late April or early May wet-7,000-8,000, above and below normal 5,000-6,000, dry 3,500-4,000 and exceptions-only when inflows are sufficient.</p>	<p>E090101</p>	<p>Provide target flows by modifying CVP operations and acquiring water as needed from willing sellers, with consideration given to available carryover storage and needs determined by the water temperature objective.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	American River Basin	Develop and implement an ecologically based streamflow regulation plan for the American Basin creeks and lower American River. The lower American River should meet the recommended flows and flow targets for the lower American River. Lower American river flow events should be coordinated with similar flows that occur naturally in the Sacramento Valley and with storage releases from Shasta and Oroville Reservoirs. Average monthly minimum flow targets (cfs): October wet-2,500, above and below normal-2,000, dry and critical-1,750 and critical relaxation-800; November-February wet-2,500, above and below normal-2,500, dry and critical-1,750 and critical relaxation-1,200; March-May wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-1,500; June wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-500; July wet-2,500, above and below normal-1,500, dry and critical-1,500 and critical relaxation-500; August wet-2,500, above and below normal-2,000, dry and critical- 1,000, and critical relaxation-500. Average flow targets for 10-day pulse (cfs), coordinated with flows from Shasta and Oroville Reservoirs: March wet-6,00-7,000, above and below normal-4,000-5,000, dry-3,000-3,500 and exceptions-only when inflows are sufficient; late April or early May wet-7,000-8,000, above and below normal 5,000-6,000, dry 3,500-4,000 and exceptions-only when inflows are sufficient.	E090102	Develop and implement a comprehensive watershed management plan for the American Basin and lower American River to protect the channel (e.g., maintain flood control capacity and reduce bank erosion) and preserve and restore the riparian corridor. Upper watershed health should be improved by reducing the potential for wildfire and implementing other watershed management practices to protect streamflows, stream channel morphologies, spawning gravel condition, and riparian habitats, and minimize sediment input to the stream.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	American River Basin	Develop and implement an ecologically based streamflow regulation plan for the American Basin creeks and lower American River. The lower American River should meet the recommended flows and flow targets for the lower American River. Lower American river flow events should be coordinated with similar flows that occur naturally in the Sacramento Valley and with storage releases from Shasta and Oroville Reservoirs. Average monthly minimum flow targets (cfs): October wet-2,500, above and below normal-2,000, dry and critical-1,750 and critical relaxation-800; November-February wet-2,500, above and below normal-2,500, dry and critical-1,750 and critical relaxation-1,200; March-May wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-1,500; June wet-4,500, above and below normal-3,000, dry and critical-2,000 and critical relaxation-500; July wet-2,500, above and below normal-1,500, dry and critical-1,500 and critical relaxation-500; August wet-2,500, above and below normal-2,000, dry and critical- 1,000, and critical relaxation-500. Average flow targets for 10-day pulse (cfs), coordinated with flows from Shasta and Oroville Reservoirs: March wet-6,00-7,000, above and below normal-4,000-5,000, dry-3,000-3,500 and exceptions-only when inflows are sufficient; late April or early May wet-7,000-8,000, above and below normal 5,000-6,000, dry 3,500-4,000 and exceptions-only when inflows are sufficient.	E090103	Acquire water from willing sellers to augment river flow during the dry years to provide fishery benefits.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	American River Basin	Minimize flow fluctuations below Nimbus Dam that can dewater salmonid redds and reduce survival of juvenile anadromous fish from stranding and/or isolation from the main channel.	E090104	Complete on-going collaborative efforts to develop flow ramping criteria and operationally implement these criteria to reduce adverse affect of flow fluctuation on lower American River fishery resources.
		Provide flows of suitable quality water that more closely emulate natural annual and seasonal streamflow patterns in American Basin watersheds.	E090105	Enter into agreements with water districts and wetland managers to provide return flows of high quality water from irrigated agriculture and seasonal wetlands to the American Basin.
			E090106	Enter into agreements with landowners and water districts to limit diversions of natural flows from creeks to improve stream flows.
			E090107	Limit diversion of natural stream flows from American Basin creeks into irrigation canals and ditches by providing other sources of water or through purchase of water rights from willing sellers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>Yolo Basin</p>	<p>More closely emulate natural seasonal patterns in Cache and Putah Creeks by providing additional flows, when available from existing water supplies. Flows in the Yolo Bypass would be supplemented, as needed, by the Colusa basin drain through the Knights Landing Ridge Cut Canal, extending the Tehama-Colusa Canal, and the Sacramento River through the Fremont weir. Supplemental flows may be needed in fall if water temperature and flow in the lower Yolo Bypass are insufficient for passage from Cache Slough to upstream areas in the Sacramento River. Supplemental flows may be needed in winter and spring to sustain downstream migrating juvenile salmon and steelhead on their journey through the Yolo Bypass to the Delta. Supplemental flows would be needed along with irrigation water from spring to fall to sustain native fish, wetlands, and riparian habitats in channel sloughs of the Yolo Bypass.</p>	<p>E100101</p>	<p>Develop a cooperative program to provide water for summer flows in Cache Creek to maintain riparian vegetation by developing new conjunctive supplies, including groundwater.</p>
			<p>E100102</p>	<p>Develop a cooperative program to provide water for target flows in Putah Creek from additional Lake Berryessa releases or reductions in water diversions at Solano Diversion Dam and in the creek downstream of the dam. Water would be obtained from willing sellers, water transfers, and by developing new supplies, including groundwater.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).</p>	<p>Sacramento River</p>	<p>Increase gravel recruitment in the upper Sacramento River between Keswick Dam and the RBDD by 10,000 to 20,000 cubic yards annually to provide adequate spawning habitat for targeted levels of salmon and steelhead and to sustain stream meander processes below Red Bluff. (This is the estimated amount of spawning-sized gravel captured annually by Shasta Dam.)</p>	<p>E030201</p>	<p>Develop a cooperative program to stockpile gravel at strategic locations along the Sacramento River below Keswick Dam where riverflow will move gravel into the river channel to mimic natural gravel recruitment into the upper river. Determine the adequacy of this action and adjust amount and locations as necessary.</p>
			<p>E030202</p>	<p>Develop a cooperative program to reactivate gravel recruitment to the river by exposing existing sources of river gravel on islands, bars, and banks that have become armored to riverflows. This action should be implemented on a conservative basis because the availability of such inchannel gravel, costs of activating the gravel, indirect impacts, and potential effectiveness have not been determined.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Sacramento River	Preserve and improve the existing stream meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030301	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030302	Purchase easements to offset losses to property owners for land lost to meander process.
		Preserve and improve the existing stream meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Sacramento River	Preserve and improve the existing stream meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030604	Purchase easements to offset losses to property owners for land lost to meander process.
		Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of SRA habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	North Sacramento Valley	Maintain existing levels of erosion and gravel recruitment in streams of the North Sacramento Valley Ecological Management Zone and, where necessary, supplement gravel recruitment through adaptive management and monitoring.	E040201	Cooperatively develop appropriate land use plans that allow the natural recruitment of sediments to streams in the North Sacramento Valley Ecological Management Zone.
		Increase existing levels of erosion and gravel recruitment in Clear Creek by 25 to 50 tons per year.	E040202	Develop a cooperative program to improve gravel quality and quantity in lower Clear Creek to maintain high-quality spawning conditions for fall-run and late-fall-run chinook salmon by evaluating the addition of 5,000 to 10,000 cubic yards annually as needed. Evaluate the need to acquire or relocate existing mining operations. Remove or alter Saeltzer Dam so that it no longer serves as a sediment trap.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	North Sacramento Valley	Increase existing levels of erosion and gravel recruitment in Cow Creek by 5 to 10 tons per year.	E040203	Develop a cooperative program to protect existing gravel and bedload movement in Cow Creek to maintain and increase future spawning gravel and sediment input to the Sacramento River by 5 to 10 tons per year by evaluating the need or opportunity to acquire or relocate existing gravel mining operations.
		Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.
		Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040402	Acquire floodplains by direct purchase or easement from willing sellers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Cottonwood Creek	Maintain existing levels of erosion and gravel recruitment in streams in the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30,000 to 40,000 tons per year.	E050201	Cooperatively develop and implement a gravel management program for Cottonwood Creek. The program would protect and maintain important ecological processes and functions related to sediment supply, gravel recruitment, and gravel cleansing and transport. This would involve working with State and local agencies and gravel operators to protect spawning gravel and enhance recruitment of spawning gravel to the Sacramento River in the valley sections of Cottonwood Creek.
			E050202	Cooperate with the aggregate resource industry to relocate existing gravel operations on Cottonwood Creek to areas outside of the active stream channel.
		Repair and rehabilitate spawning gravels in 10 to 20 miles of the lower South Fork and mainstem of Cottonwood Creek.	E050203	In the short term, develop a cooperative program to rip and clean or reconstruct important salmon spawning riffles on the South Fork Cottonwood Creek and on lower Cottonwood Creek below the South Fork.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Colusa Basin	Establish a desirable level of sediment deposition in the Colusa Basin.	E060401	Improve the Colusa Basin sediment deposition capacity by working with local landowners to develop an integrated plan consistent with flood-control requirements.
	Butte Basin	Develop a cooperative program to replenish spawning gravel in Big Chico Creek, especially in stream reaches that have been modified for flood control so that there is no net loss of sediments transported through the Sycamore, Lindo Channel, and Big Chico Creek split.	E070201	Assist in the redesign and reconstruct the flood control box culvert structures on Big Chico Creek near the Five-Mile Recreation Area to allow the natural downstream transport of stream sediments.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Butte Basin	Develop a cooperative program to improve fall-run chinook salmon spawning habitat in the lower 8 miles of Mill Creek.	E070202	Develop a cooperative program to improve chinook salmon spawning habitats in lower Mill Creek by reactivating and maintaining natural sediment transport processes.
		Improve spawning gravel and gravel availability in Butte Creek.	E070203	Develop a cooperative program to improve spawning habitat in Butte Creek by maintaining natural sediment transport processes.
	Feather River\Sutter Basin	Maintain existing levels of erosion and gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E080201	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Feather River. If indicated, renovate or supplement gravel supplies to enhance substrate quality by importing 4,000 to 8,000 tons of additional gravel below the hatchery as conditions require.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).</p>	<p>Feather River\Sutter Basin</p>	<p>Maintain existing levels of erosion and gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.</p>	<p>E080202</p>	<p>Evaluate the quality of spawning gravel in areas used by chinook salmon in the Yuba River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.</p>
			<p>E080203</p>	<p>Evaluate the quality of spawning gravel in areas used by chinook salmon in the Bear River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.</p>
		<p>Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.</p>	<p>E080303</p>	<p>Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	American River Basin	Maintain, improve, or supplement gravel recruitment and natural sediment transport in the lower American River and American Basin watersheds to maintain natural ecological processes linked to stream channel maintenance, erosion and deposition, maintenance of spawning areas, and the regeneration of riparian vegetation.	E090201	Implement a pilot study to assess the benefits of mechanical cleaning to improve gravel permeability.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	American River Basin	Maintain the existing stream meander configuration along the American River between Nimbus Dam and the Sacramento River	E090401	Maintain a stream meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood control needs. These parties include the Corps, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.
		Restore natural stream meanders in the floodplains of American Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090404	Setback levees in the floodplains of creeks and canals of the American Basin.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	American River Basin	Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.
			E090409	Reduce or eliminate gravel mining from active stream channels.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Yolo Basin	Restore gravel recruitment in Cache and Putah Creeks to meet the needs of spawning fish, maintain natural stream channel meanders and bar formation where consistent with flood protection and adjoining land uses, and match existing rates of downstream displacement.	E100201	Develop a cooperative program to supplement gravel recruitment below Solano Diversion Dam as needed to replace natural gravel recruitment interrupted by these diversion dams.
			E100202	Develop a cooperative program to supplement gravel in areas downstream of the diversion dams where other structures or gravel mining have interrupted the gravel recruitment process.
		Protect, enhance, and restore natural gravel recruitment within the active floodplain and remnant gravel pits.	E105101	Develop a cooperative program to fill remnant gravel pits within the active floodplain of the creeks, and restore natural channel configurations where there are remnant gravel mining effects.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Sacramento River	Maintain mean daily water temperatures at levels suitable for maintenance of all life-history stages of chinook salmon and steelhead in the Sacramento River between Keswick Dam and RBDD in above normal and wet years, and between Keswick Dam and RBDD in other year types.	E030501	Cooperatively develop and implement a balanced river regulation program that provides sufficient carryover storage at Shasta Dam to ensure that suitably low water temperatures are reached to protect chinook salmon spawning, incubating eggs, and young fish, particularly in consecutive dry and critically dry years.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Feather River\Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080501	Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white and green sturgeon to spawning habitat, or facilitate passage around these barriers.
			E080502	Develop a cooperative approach to operating reservoirs in the Yuba River watershed to provide adequate water temperatures for anadromous fish.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Feather River\Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080503	Develop a cooperative program to maintain mean daily water temperatures between 61°F and 65°F for at least 1 month from April 1 to June 30 for American shad spawning in the Feather River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects on water-supply operations.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Feather River\Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080504	Evaluate whether improving water temperature control with shutter configuration and present management of the coldwater pool at New Bullards Bar Dam on the Yuba River is effective. Modify the water release outlets at Englebright Dam if these improvements are effective.
			E080505	Develop a cooperative program to maintain mean daily water temperatures between 61°F and 65°F for at least 1 month from April 1 to June 30 for American shad spawning in the Yuba River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects on water-supply operations.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Feather River\Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080506	Develop a cooperative approach to providing adequate water temperatures in the Bear River for all life stages of chinook salmon and steelhead.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).</p>	<p>American River Basin</p>	<p>Maintain lower American River water temperatures in the upper portion of the reach between Nimbus Dam and Sunrise Bridge and in the upper portions of Coon Creek, Doty Creek, Auburn Ravine, and Secret Ravine in the American Basin below 650F . Maintain lower American River water temperatures in the spawning and rearing reach between Arden Bar and Nimbus Dam at or below 600F beginning as early in October as possible, based on annual coldwater pool availability.</p>	<p>E090501</p>	<p>Optimally manage Folsom Reservoir's coldwater pool via real-time operation of the water-release shutters to provide the maximum equitable thermal benefits to lower American River steelhead and chinook salmon throughout the year, within the constraints of reservoir coldwater pool availability</p>
			<p>E090502</p>	<p>Reconfigure Folsom Dan shutters to improve management of Folsom Reservoir's coldwater pool and maintain better control over the temperature of water release downstream.</p>
			<p>E090503</p>	<p>Install a temperature control device at the urban water intakes at Folsom Dam. Doing so would facilitate diverting water at elevations above 317 (msl), which would preserve the reservoir's cold water pool for release to the lower American River.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Sacramento River	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of SRA habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.
		Preserve and improve the existing stream meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030301	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030302	Purchase easements to offset losses to property owners for land lost to meander process.
		Preserve and improve the existing stream meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
	North Sacramento Valley		E030604	Purchase easements to offset losses to property owners for land lost to meander process.
		Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	North Sacramento Valley	Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040402	Acquire floodplains by direct purchase or easement from willing sellers.
	Cottonwood Creek	Maintain existing levels of erosion and gravel recruitment in streams in the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30,000 to 40,000 tons per year.	E050201	Cooperatively develop and implement a gravel management program for Cottonwood Creek. The program would protect and maintain important ecological processes and functions related to sediment supply, gravel recruitment, and gravel cleansing and transport. This would involve working with State and local agencies and gravel operators to protect spawning gravel and enhance recruitment of spawning gravel to the Sacramento River in the valley sections of Cottonwood Creek.
			E050202	Cooperate with the aggregate resource industry to relocate existing gravel operations on Cottonwood Creek to areas outside of the active stream channel.
		Repair and rehabilitate spawning gravels in 10 to 20 miles of the lower South Fork and mainstem of Cottonwood Creek.	E050203	In the short term, develop a cooperative program to rip and clean or reconstruct important salmon spawning riffles on the South Fork Cottonwood Creek and on lower Cottonwood Creek below the South Fork.
		Preserve or restore the 50- to 100-year floodplain and existing channel meander characteristics of streams in the Cottonwood Creek Ecological Zone, particularly in low-gradient areas throughout the lower 20 miles where most deposition occurs and where stream channel meander is most pronounced.	E050301	In the short term, develop a cooperative program to mechanically create a more defined stream channel in lower Cottonwood Creek to facilitate fish passage by minimizing water infiltration through the streambed and maintaining flow connectivity with the Sacramento River until such time that natural meander returns.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Cottonwood Creek	Develop a cooperative program to identify opportunities to allow Cottonwood Creek to seasonally inundate its floodplain.	E050401	Minimize adverse effects of permanent structures such as bridges on floodplain processes.
		Restore upper watershed health.	E050402	Reduce excessive fire fuel loads in upper watersheds.
			E050403	Improve forestry management practices, including timber harvest, road building and maintenance, and livestock grazing practices.
		Protect, restore, and maintain the Cottonwood Creek watershed by eliminating conflict between land use practices and watershed health.	E050404	Cooperatively work with landowners and federal land management agencies to facilitate watershed protection and restoration and reduce siltation to improve holding, spawning, and rearing habitats for salmonids.
	E050405		Develop a cooperative program to implement improved fencing, grazing, and other land management practices on private and national forest lands, and encourage local counties to adopt stronger grading and road building ordinances to control erosion.	
	Colusa Basin	Establish a desirable level of sediment deposition in the Colusa Basin.	E060401	Improve the Colusa Basin sediment deposition capacity by working with local landowners to develop an integrated plan consistent with flood-control requirements.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Butte Basin	Develop a cooperative program to replenish spawning gravel in Big Chico Creek, especially in stream reaches that have been modified for flood control so that there is no net loss of sediments transported through the Sycamore, Lindo Channel,	E070201	Assist in the redesign and reconstruct the flood control box culvert structures on Big Chico Creek near the Five-Mile Recreation Area to allow the natural downstream transport of stream sediments.
		Develop a cooperative program to improve fall-run chinook salmon spawning habitat in the lower 8 miles of Mill Creek.	E070202	Develop a cooperative program to improve chinook salmon spawning habitats in lower Mill Creek by reactivating and maintaining natural sediment transport processes.
		Improve spawning gravel and gravel availability in Butte Creek.	E070203	Develop a cooperative program to improve spawning habitat in Butte Creek by maintaining natural sediment transport processes.
	Feather River\Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.
			E080302	Build local support for maintaining active meander zones by establishing a mechanism whereby property owners would be reimbursed for land lost to natural meander processes.
			E080303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E080401	Restore as needed stream channel and overflow basin configurations within the floodplain.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Feather River\Sutter Basin	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E080402	Minimize effects of permanent structures, such as bridges and diversion dams, on floodplain processes.
	American River Basin	Maintain the existing stream meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090401	Maintain a stream meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood control needs. These parties include the Corps, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.
			E090402	Where possible, maintain mainstem and side channel habitats typical of a natural river that provide salmon and steelhead spawning and rearing habitat.
		Restore natural stream meanders in the floodplains of American Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090404	Setback levees in the floodplains of creeks and canals of the American Basin.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	American River Basin	Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090408	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.
			E090408	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.
		Enhance shaded riverine aquatic habitat in American Basin creeks and drainage canals and ditches and along the lower American River.	E091604	Terminate or modify current programs that remove woody debris from the river and creek channels.
			E091605	Restore side channels along the lower American River to provide additional riparian corridors for increasing fish and wildlife habitat.
		Maintain, improve, or supplement gravel recruitment and natural sediment transport in the lower American River and American Basin watersheds to maintain natural ecological processes linked to stream channel maintenance, erosion and deposition, maintenance of spawning areas, and the regeneration of riparian vegetation.	E090201	Implement a pilot study to assess the benefits of mechanical cleaning to improve gravel permeability.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13c. Enhancement and management of up to 46,890 acres of existing seasonal wetlands for wildlife.	Colusa Basin	Protect and manage 2,000 acres of existing seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E061501	Develop and implement a cooperative program to improve management of 2,000 acres of existing, degraded seasonal wetland habitat.
		Develop and implement a cooperative program to enhance 26,435 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the north American Waterfowl Management Plan.	E061502	Restore and manage seasonal wetland habitat throughout the ecological zone.
	Butte Basin	Assist in protecting 10,000 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E071501	Develop and implement a cooperative program to improve management of 10,000 acres of existing, degraded seasonal wetland habitat.
		Develop and implement a cooperative program to enhance 26,150 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E071502	Restore and manage seasonal wetland habitat throughout the ecological zone.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13c. Enhancement and management of up to 46,890 acres of existing seasonal wetlands for wildlife.	Feather River\Sutter Basin	Assist in protecting 500 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081501	Develop and implement a cooperative program to improve management of 500 acres of existing, degraded seasonal wetland habitat in the Sutter Bypass Ecological Unit.
		Develop and implement a cooperative program to enhance 3,090 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081502	Restore and manage seasonal wetland habitat throughout the Sutter Bypass Ecological Management Unit.
	American River Basin	Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090405	Protect existing overflow areas from future reclamation.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090406	Develop floodway detention basins in the floodplains of the American Basin to temporarily store floodwaters.
		Protect and enhance 5,150 acres of seasonal wetland habitat acreage in the American River Basin consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E091501	Protect 2,000 acres of existing wetland habitat through fee acquisition and perpetual conservation easements.
			E091502	Enhance 3,150 acres of existing wetlands.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031601	Develop a cooperative program to plant vegetation on unvegetated, riprapped banks consistent with flood control requirements. Implementation will occur in phases, results will be monitored and restoration approach will be adjusted as necessary under adaptive management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of SRA habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Increase the ecological value of low-to moderate-quality SRA habitat by changing land use and land management practices.	E031603	Purchase property or easements and allow habitat to improve naturally. Properties to be considered should be developed through a process of prioritizing based on quality and importance of habitat, technical feasibility and cost of purchase and improvement, and consent of landowners.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Increase the ecological value of low-to moderate-quality SRA habitat by changing land use and land management practices.	E031604	Provide incentives and technical support for private landowners to protect and improve existing SRA habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Maintain existing streamside riparian vegetation.	E031605	Through purchase, conservation easement, and voluntary participation of landowners, protect SRA habitat from development. Where high-priority properties are already in government ownership or available for purchase or easement, preservation efforts should be undertaken as experiments to develop technical details, cost-effectiveness, and overall approach and consensus for the program. Full implementation of this program would depend on results of experiments and subject to adaptive management.
			E030302	Purchase easements to offset losses to property owners for land lost to meander process.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Preserve and improve the existing stream meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000 to 12,000 acres of riparian lands in the meander zone.	E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood management requirements, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030304	Purchase easements to offset losses to property owners for land lost to meander process.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Reduce the area of invasive non-native woody species, such as giant reed and salt cedar, that compete with native riparian vegetation.	E035301	Implement a program along the length of the Sacramento River to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation.
			E035302	Implement a program to eliminate invasive woody plants that could interfere with the restoration of native riparian vegetation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	North Sacramento Valley	Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.
		Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040401	Acquire floodplains by direct purchase or easement from willing sellers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	North Sacramento Valley	Develop a cooperative program to establish riparian habitat zones along streams in the North Sacramento Valley Ecological Zone through conservation easements, fee acquisition, or voluntary landowner measures.	E041601	Develop a cooperative program to establish, restore, and maintain riparian habitat on Clear Creek through conservation easements, fee acquisition, or voluntary landowner cooperation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	North Sacramento Valley	Develop a cooperative program to establish riparian habitat zones along streams in the North Sacramento Valley Ecological Zone through conservation easements, fee acquisition, or voluntary landowner measures.	E041602	Encourage the development of long-term measures in the comprehensive watershed management plan to further improve water temperatures. Develop a cooperative approach with counties and local agencies to implement land use management that protects riparian vegetation along the streams and develop programs to restore lost riparian vegetation.
			E041603	Cooperatively negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Cow, Bear, and Battle Creeks.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Cottonwood Creek	Develop a cooperative program to establish a continuous 130-mile riparian habitat zone along upper and lower Cottonwood Creek and its tributaries through conservation easements, fee acquisition, or voluntary landowner measures.	E051601	Develop a cooperative program to establish, restore, and maintain riparian habitat on Cottonwood Creek through conservation easements, fee acquisition, or voluntary landowner cooperation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Cottonwood Creek	Develop a cooperative program to establish a continuous 130-mile riparian habitat zone along upper and lower Cottonwood Creek and its tributaries through conservation easements, fee acquisition, or voluntary landowner measures.	E051602	Encourage the development of long-term measures in the comprehensive watershed management plan to further improve water temperatures. Develop a cooperative approach with counties and local agencies to implement land use management to protect riparian vegetation along the streams and developing programs to restore lost riparian vegetation.
			E051603	Cooperatively negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Cottonwood Creek.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Colusa Basin	Protect and maintain riparian vegetation along Stony Creek, Elder Creek, and the Colusa Basin Ecological Unit channels and sloughs where possible. This will provide cover and other essential habitat requirements for native resident fish species and wildlife.	E061601	Develop a cooperative program to restore riparian vegetation where possible.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Colusa Basin	Eradicate arundo and tamarisk in watersheds where they have only small population, then concentrate on eradicating satellite populations extending beyond major infestations, and finally, reduce and eventually eliminate the most extensive populations.	E065301	Develop a cooperative pilot study to control arundo (false bamboo) and tamarisk (salt cedar) in streams within the Colusa Basin Ecological Zone.
	Butte Basin	Develop a cooperative program to restore and maintain riparian habitat along the lower 10 miles of Mill Creek.	E071601	Develop a cooperative program to restore and maintain riparian habitat along Mill Creek through acquisition of conservation easement or by voluntary landowner participation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Butte Basin	Develop a cooperative program to restore and maintain riparian habitat along Big Chico Creek.	E071603	Cooperate with local landowners to encourage revegetation of denuded stream reaches and to establish, restore, and maintain riparian habitat on Big Chico Creek.
		Develop a cooperative program to restore and maintain riparian habitat along Butte Creek.	E071604	Cooperate with local landowners to encourage revegetation of denuded stream reaches and to establish, restore, and maintain riparian habitat on Butte Creek.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Feather River\Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.
			E080302	Build local support for maintaining active meander zones by establishing a mechanism whereby property owners would be reimbursed for land lost to natural meander processes.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.</p>	<p>Feather River\Sutter Basin</p>	<p>Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.</p>	<p>E080303</p>	<p>Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Feather River/Sutter Basin	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E080401	Restore as needed stream channel and overflow basin configurations within the floodplain.
		Provide conditions for growth of riparian vegetation along sections of rivers in the Feather River/Sutter Basin Ecological Zone.	E081601	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Yuba River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Feather River\Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E081602	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Feather River.
			E081603	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Bear River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Maintain the existing stream meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090401	Maintain a stream meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood control needs. These parties include the Corps, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore natural stream meanders in the floodplains of American Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American Basin.	E090404	Setback levees in the floodplains of creeks and canals of the American Basin.
			E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Establish and/or maintain a sustainable continuous corridor of riparian habitat along the lower American River and American Basin creeks.	E091601	Protect riparian habitat along water courses of the American Basin.
			E091602	Plant riparian vegetation along water courses of the American Basin.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Establish and/or maintain a sustainable continuous corridor of riparian habitat along the lower American River and American Basin creeks.	E091603	Reduce land use practices such as livestock grazing and watering along stream channels of the American Basin that cause degradation of riparian habitat
		Enhance shaded riverine aquatic habitat in American Basin creeks and drainage canals and ditches and along the lower American River.	E091606	Improve levee management practices to protect and enhance riparian and SRA habitat

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Reduce populations of invasive non-native plants that compete with the establishment and succession of native riparian vegetation along the American River. This will help to reestablish native riparian vegetation in floodplains, increase SRA cover, and increase habitat values for riparian-associated wildlife.	E095301	

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Yolo Basin	Restore riparian vegetation along Cache Creek, Putah Creek, and Yolo Bypass and Solano Ecological Unit channels and sloughs where possible to provide cover and other essential habitat requirements for salmon, steelhead, native resident fish species and wildlife.	E101601	Develop a cooperative program to restore riparian vegetation where possible and fill gaps in forest continuity.
			E101602	Develop a cooperative program to protect existing riparian corridors along creeks, streams, sloughs, and channels connecting to the Delta.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Yolo Basin	Restore riparian vegetation along Cache Creek, Putah Creek, and Yolo Bypass and Solano Ecological Unit channels and sloughs where possible to provide cover and other essential habitat requirements for salmon, steelhead, native resident fish species and wildlife.	E101603	Develop a cooperative program to plant riparian vegetation and provide for early development until such time that it becomes naturally self-sustaining.
			E101604	Develop a cooperative control program for non-native riparian plants where necessary to ensure development of healthy natural riparian corridors.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of 9,000–13,000 acres of riparian habitat in meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Yolo Basin	Reduce populations of invasive non-native plant species that compete with the establishment and succession of native riparian vegetation along Cache Creek and Putah Creek to assist in the natural reestablishment of native riparian vegetation in floodplains, increase SRA cover for fish, and increase habitat values for riparian-associated wildlife.	E105301	Develop a cooperative program to monitor the distribution and abundance of non-native plants and develop cooperative control programs as needed.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E16c. Restoration of perennial grassland associated with existing or restored wetlands in the American River basin.	American River Basin	Restore perennial grasses in the American Basin Ecological Management Unit associated with existing or proposed wetlands.	E091801	Develop a cooperative program to restore perennial grasslands by acquiring conservation easements or purchasing land from willing sellers.
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Colusa Basin	Cooperatively manage 111,285 acres of agricultural lands.	E061901	Increase the area of rice fields and other crop lands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
			E061902	Convert agricultural lands in the Colusa Basin Ecological Zone from crop types of low forage value for wintering waterfowl and other wildlife to crop types of greater forage value.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Colusa Basin	Cooperatively manage 111,285 acres of agricultural lands.	E061903	Defer fall tillage on rice fields in the Colusa Basin Ecological Zone to increase the forage for wintering waterfowl and associated wildlife.
	Butte Basin	Cooperatively manage 108,832 acres of agricultural lands.	E071901	Increase the area of rice fields and other crop lands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
		Cooperatively manage 108,832 acres of agricultural lands.	E071902	Convert agricultural lands in the Butte Basin Ecological Zone from crop types of low forage value for wintering waterfowl and other wildlife to crop types of greater forage value.
	E071903	Defer fall tillage on rice fields in the Butte Basin Ecological Zone to increase the forage for wintering waterfowl and associated wildlife.		
Feather River\Sutter Basin	Cooperatively manage 57,578 acres of agricultural lands consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081901	Increase the area of rice fields and other crop lands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.	

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	American River Basin	Restore and maintain migration corridors.	E091901	Purchase land or conservation easements from willing sellers on which to restore wildlife habitat to connect existing grassland or agricultural wildlife habitat.
		Enhance 20,948 acres of private agricultural land to better support nesting and wintering waterfowl consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E091902	Develop cooperative programs with farmers to conduct wildlife friendly practices.
E22. Reduction in the adverse effects of diversions on fish.	Sacramento River	Reduce entrainment of juvenile salmon, steelhead, sturgeon, and splittail into water diversions to levels that will not impair stock rebuilding or species restoration.	E034701	Develop a cooperative program to screen all diversions greater than 250 cfs and one- to two-thirds of all smaller unscreened diversions. This programmatic level of action should be sufficient to provide the data necessary to modify this target through adaptive management.
			E034702	Develop a cooperative program to upgrade screening at diversions with ineffective screening. Where existing screening has proven less than effective and entrainment problems continue, immediate action should be taken to upgrade screens.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	Sacramento River	Reduce entrainment of juvenile salmon, steelhead, sturgeon, and splittail into water diversions to levels that will not impair stock rebuilding or species restoration.	E034703	Develop a cooperative program to reduce diversions when and where juvenile salmon are present in large or significant numbers. Even with screens, some diversions may pose a threat to young salmon and steelhead, and it may be necessary to modify operations of the diversion. Such determinations will be made after necessary monitoring and evaluation, and on a case-by-case basis, with decisions made with agency and stakeholder involvement, and with consideration given to appropriate alternatives.
			E034704	Promote and support relocating water diversions and developing alternate methods of supplying water from the Sacramento River that protect fish but also minimize conflict with maintaining dynamic fluvial river processes.
	North Sacramento Valley	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Battle Creek.	E044701	Develop a cooperative approach to improve conditions for anadromous fish in Battle Creek by installing fish screens at four diversions on the North Fork, three diversions on the South Fork, and one diversion on the mainstem, or acquire water rights to eliminate the need for diversion and screening.
			E044702	Improve the survival of adult salmon and steelhead in Battle Creek by installing a rack at the head of Gover Diversion Canal to prevent straying.
		Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversions on Clear Creek.	E044703	Acquire water rights on Clear Creek at the McCormick-Saeltzer Dam to eliminate the need for diversion.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	North Sacramento Valley	Work with landowners and diverters on Cow Creek to reduce the adverse effects of 13 seasonal diversion dams in South Cow Creek, 10 diversion dams in Old Cow Creek, two diversion dams in North Cow Creek, and one diversion dam in Clover Creek that are barriers to migrating chinook salmon and steelhead to allow access to 100% of the habitat below any natural bedrock falls.	E044801	Improve passage conditions on Cow Creek by acquiring water rights from willing sellers, removing diversions, or providing alternative sources of water during important periods.
		Work with landowners and diverters on Bear Creek to reduce the adverse effects of dewatering the stream channel at seasonal diversion dams, which results in no passage for migrating chinook salmon.	E044802	Improve passage and habitat conditions in Bear Creek by acquiring water rights from willing sellers, evaluating the removal of diversion dams, or providing alternative sources of water during important periods.
		Work with landowners, diverters, and other State or federal agencies managing Battle Creek to improve fish passage.	E044803	Develop a cooperative program to upgrade or replace existing fish ladders or evaluate the removal of diversion dams and other impediments to passage.
	Butte Basin	Improve the survival of chinook salmon and steelhead in Butte Creek by cooperating in the installation of positive barrier fish screens.	E074701	Improve the survival of juvenile chinook salmon and steelhead in Butte Creek by supporting the installation of screened portable pumps as an alternative to the Little Dry Creek diversion.
			E074702	Increase the survival of juvenile chinook salmon and steelhead on Butte Creek by assisting local interests in the installation of positive-barrier fish screens at the Durham-Mutual Diversion Dam.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E074703	Increase the survival of juvenile chinook salmon and steelhead on Butte Creek by assisting local interests in the installation of positive-barrier fish screens at Adams Dam.
E22. Reduction in the adverse effects of diversions on fish.	Butte Basin	Improve the survival of chinook salmon and steelhead in Butte Creek by cooperating in the installation of positive barrier fish screens.	E074704	Increase the survival of juvenile salmon and steelhead on Butte Creek by assisting local interests in the installation of positive-barrier fish screens at Gorrill Dam.
	Feather River\Sutter Basin	Improve the survival of juvenile anadromous fish in the Yuba River by installing, upgrading, or replacing fish screens.	E084701	Develop a cooperative program to improve efficiency of screening devices in the Yuba River at the Hallwood-Cordua water diversion, and construct screens at the Brown's Valley water diversion and other unscreened diversions.
		Improve the survival of juvenile anadromous fish in the Bear River by installing, upgrading, or replacing fish screens.	E084703	Develop a cooperative program to evaluate and screen diversions in the Bear River to protect all life stages of anadromous fish.
		Improve the survival of juvenile anadromous fish in the Feather River by installing, upgrading, or replacing fish screens.	E084704	Develop a cooperative program to evaluate and screen diversions in the Feather River to protect all life stages of anadromous fish.
	American River Basin	Reduce losses of juvenile salmon and steelhead in the lower American River and American Basin creeks due to entrainment at water intake structures.	E094701	Upgrade the fish screens at the Fairbairn Water Treatment Plant to comply with DFG and NMFS fish screening criteria.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E094702	Screen diversion from the NCC, NEMDC, Dry Creek, Coon Creek, and Auburn Ravine that operate during times when salmon and steelhead juveniles are present.
	Yolo Basin	Screen all diversions in the Yolo Bypass channels and sloughs.	None.	None.
E22. Reduction in the adverse effects of diversions on fish.	Yolo Basin	Screen all diversions in the Yolo Bypass channels and sloughs.	E104701	Develop a cooperative program to construct a weir or screen at the lower end of the Knights Landing Ridge Cut Canal to keep adult salmon and steelhead from migrating into the Colusa Drain.
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Sacramento River	Minimize survival problems for adult and juvenile anadromous fish at RBDD by permanently raising the gates during the non-irrigation season and improving passage facilities during the irrigation season.	E034801	Upgrade fish passage facilities at the RBDD.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Sacramento River	Reduce blockage to fish migrations at the ACID dam.	E034802	Evaluate the need to upgrade fish passage facilities at the ACID dam.
	North Sacramento Valley	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Battle Creek.	E044702	Improve the survival of adult salmon and steelhead in Battle Creek by installing a rack at the head of Gover Diversion Canal to prevent straying.
		Work with landowners and diverters on Cow Creek to reduce the adverse effects of 13 seasonal diversion dams in South Cow Creek, 10 diversion dams in Old Cow Creek, two diversion dams in North Cow Creek, and one diversion dam in Clover Creek that are barriers to migrating chinook salmon and steelhead to allow access to 100% of the habitat below any natural bedrock falls.	E044801	Improve passage conditions on Cow Creek by acquiring water rights from willing sellers, removing diversions, or providing alternative sources of water during important periods.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	North Sacramento Valley	Work with landowners and diverters on Bear Creek to reduce the adverse effects of dewatering the stream channel at seasonal diversion dams, which results in no passage for migrating chinook salmon.	E044802	Improve passage and habitat conditions in Bear Creek by acquiring water rights from willing sellers, evaluating the removal of diversion dams, or providing alternative sources of water during important periods.
		Work with landowners, diverters, and other State or federal agencies managing Battle Creek to improve fish passage.	E044803	Develop a cooperative program to upgrade or replace existing fish ladders or evaluate the removal of diversion dams and other impediments to passage.
		Work with landowners and diverters on Clear Creek to improve fish passage between its mouth and Whiskeytown Dam.	E044804	Develop a cooperative program to improve fish passage on Clear Creek by upgrading or replacing the fish ladder at McCormick Dam.
		Reduce or eliminate conflicts in Battle Creek that require excluding anadromous fish from the upper section to protect the Coleman National Fish Hatchery water supply.	E044805	Develop an alternative or disease-free water supply for the hatchery to allow naturally spawning salmon and steelhead access to the full 41-mile reach of Battle Creek above the Coleman National Fish Hatchery weir.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.</p>	<p>Butte Basin</p>	<p>Improve chinook salmon and steelhead survival in Antelope Creek by developing a cooperative program to reduce the use of seasonal diversion dams by 50% during the late spring, early fall, and winter.</p>	<p>E074801</p>	<p>Develop a cooperative program to evaluate the reduced use of seasonal diversion dams that may be barriers to migrating chinook salmon and steelhead in Antelope Creek by acquiring water rights or providing alternate sources of water.</p>
		<p>Develop a cooperative program to improve the upstream passage of adult chinook salmon and steelhead in Big Chico Creek by providing access to 100% of habitat located below natural barriers.</p>	<p>E074802</p>	<p>Repair or reconstruct the fish ladders in Big Chico Creek to improve opportunity for the upstream passage of adult spring-run chinook salmon and steelhead trout.</p>
		<p>Develop a cooperative program to improve the upstream passage of adult chinook salmon and steelhead in Big Chico Creek by providing access to 100% of habitat located below natural barriers.</p>	<p>E074803</p>	<p>Repair the Lindo Channel weir and fishway at the Lindo Channel box culvert at the Five Mile Diversion to improve upstream fish passage.</p>
		<p>Develop a cooperative approach to ensure unimpeded upstream passage of adult spring-run chinook salmon and steelhead in Mill Creek.</p>	<p>E074804</p>	<p>Cooperatively develop and implement an interim fish passage corrective program at Clough Dam on Mill Creek until a permanent solution is cooperatively developed with the landowners.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Butte Basin	Develop a cooperative program to improve the upstream passage of adult spring-run chinook salmon and steelhead in Butte Creek to allow access to 100% of the habitat below the Centerville Head Dam.	E074805	Improve the survival and passage of chinook salmon and steelhead in Butte Creek by cooperatively developing and evaluating operational criteria and potential modifications to the Butte Slough outfall.
		Develop a cooperative program to improve the upstream passage of adult spring-run chinook salmon and steelhead in Butte Creek to allow access to 100% of the habitat below the Centerville Head Dam.	E074806	Increase the survival of chinook salmon in Butte Creek by cooperatively assist local interests in eliminating stranding at the drainage outfalls in the lower reach.
	Feather River\Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080501	Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white and green sturgeon to spawning habitat, or facilitate passage around these barriers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Feather River\Sutter Basin	Increase adult and juvenile anadromous fish passage in the Yuba River by providing access to 100% of the available habitat below Englebright Dam.	E084801	Develop a cooperative program to improve survival of anadromous fish in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions.
		E084802	Facilitate passage of spawning adult salmonids in the Yuba River by maintaining appropriate flows through the fish ladders or modifying the fish ladders at diversion dams.	
		Improve survival of chinook salmon and steelhead in the Bear River by providing access to 100% of the habitat available below the SSID diversion dam.	E084803	Improve survival and passage of chinook salmon and steelhead in the Bear River by negotiating with landowners to remove or modify culvert crossings on the Bear River.
	Yolo Basin	Prevent adult salmon and steelhead stranding during their upstream migrations.	E104701	Develop a cooperative program to construct a weir or screen at the lower end of the Knights Landing Ridge Cut Canal to keep adult salmon and steelhead from migrating upstream into the Colusa basin drain.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E24. Reduction in levels of predation on juvenile anadromous fish.	Sacramento River	Reduce the adverse effects of predatory fish by identifying and eliminating humanmade instream structures or operational conditions that allow unnatural rates of predation.	E035601	Selectively evaluate areas and make physical changes to structures in the Sacramento River, such as bridge abutments, diversion dams, and water intakes, that currently may attract predators and provide them with additional advantages in preying on juvenile salmon and steelhead. Pilot studies and evaluations are needed to determine the types of changes required and the potential degree of implementation.
	Feather River\Sutter Basin	Increase the survival of adult and juvenile anadromous fish in the Yuba River by providing access to 100% of the habitat available below Englebright Dam.	E084801	Develop a cooperative program to improve survival of anadromous fish in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Sacramento River	Reduce illegal harvest of fish species to a minimum to maintain or increase populations by increasing enforcement efforts by 50 to100%.	E035801	Increase enforcement efforts.
		Manage the legal harvest of chinook salmon, steelhead, and sturgeon by shifting harvest from natural stocks to hatchery-reared stocks where possible or reducing harvest of wild stocks until the naturally produced populations recover.	E035802	Develop a cooperative program to mark all hatchery salmon and steelhead, allowing selective harvest of hatchery fish while limiting harvest of wild fish. This action should be implemented on a short-term and experimental basis to ensure that it meets its objective and is cost effective.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Sacramento River	Manage the legal harvest of chinook salmon, steelhead, and sturgeon by shifting harvest from natural stocks to hatchery-reared stocks where possible or reducing harvest of wild stocks until the naturally produced populations recover.	E035803	Encourage regulatory agencies to change fishing regulations (i.e., by restricting seasons, limits, and gear and reducing harvest of wild fish) to further reduce legal harvest and any ancillary effects of fishing gear or techniques. Restrictions should be severe in the short term. Long-term restrictions would depend on response of populations and effectiveness of restrictions and the degree of effectiveness of the action.
	North Sacramento Valley	Develop harvest management strategies that allow wild, the naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E045801	Control illegal harvest by providing increased enforcement efforts.
		Develop harvest management strategies that allow wild, the naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E045802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet the target.
			E045803	Reduce the harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting a selective fishery.
	Butte Basin	Develop harvest management strategies that allow wild, the naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E075801	Control illegal harvest by providing increased enforcement efforts.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E075802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet the target.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Butte Basin	Develop harvest management strategies that allow wild, the naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E075803	Reduce the harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting a selective fishery.
	Feather River\Sutter Basin	Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that make full use of existing and restored habitat, and focus harvest on hatchery-produced fish.	E085801	Control illegal harvest by increasing enforcement efforts.
		Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that make full use of existing and restored habitat, and focus harvest on hatchery-produced fish.	E085802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet target levels.
			E085803	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting selective harvesting.
	American River Basin	Develop harvest management strategies for Central Valley chinook salmon and steelhead populations that allow populations of naturally spawned fish to attain levels that fully use existing and restored habitat.	E095801	Control illegal harvest of chinook salmon and steelhead by increasing enforcement efforts.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	Sacramento River	Limit hatchery stocking to populations that cannot be sustained through natural production.	E095802	Develop harvest management plans for chinook salmon and steelhead with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet target escapement and production goals for lower American River and American basin creeks.
		Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	E035901	Augment winter-run, spring-run, and late-fall-run chinook salmon and steelhead with hatchery-produced smolts during the short-term rebuilding phase of restoration efforts and only when alternative measures are deemed insufficient to provide recovery of the populations. Stocking of hatchery-reared fish will be undertaken as experiments and adjusted or terminated as necessary depending on results.
			E035902	Rear salmon and steelhead in hatcheries on natal streams to limit straying. If hatchery augmentation of Sacramento River populations of salmon and steelhead is necessary, then hatcheries should be built on the Sacramento River for that purpose.
			E035903	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
		Minimize further threats of hatchery fish contaminating wild stocks of salmon and steelhead.	E035904	Where hatchery production is underway and continues, methods should be adopted and improved for the selection of an appropriate cross section of the adult population for spawning at the hatchery.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	Sacramento River	Minimize further threats of hatchery fish contaminating wild stocks of salmon and steelhead.	E035905	Select spawning adults of appropriate genetic makeup to minimize genetic contamination of existing hatchery and naturally producing stocks of salmon and steelhead. Given the present difficulty of determining genetic makeup of spawning adults selected for hatcheries, this action will necessarily be experimental. Hatchery-reared adults may be preferentially selected or not selected if they are adequately marked or tagged, or have other identifiable feature. Other methods may be developed to genetically categorize naturally produced or hatchery fish.
	North Sacramento Valley	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E045901	Augment populations of fall chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
		Minimize further threats of hatchery fish contaminating naturally produced stocks of chinook salmon and steelhead.	E045902	Adopt methods for selecting adult spawners for the hatchery from an appropriate cross-section of the adult population available to the hatchery.
	Butte Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E075901	Augment populations of fall chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
		Minimize further threats of hatchery fish contaminating naturally produced stocks of chinook salmon and steelhead.	E075902	Adopt methods for selecting adult spawners for the hatchery from an appropriate cross-section of the adult population available to the hatchery.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	Feather River\Sutter Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E085902	Augment populations of fall-run chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
	Feather River\Sutter Basin	Minimize further threats of hatchery-produced fish interbreeding with wild stocks of chinook salmon and steelhead.	E085903	Adopt methods for selecting spawning adults for the hatchery from an appropriate cross section of the adult population available to the hatchery.
	American River Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E095901	Augment populations of fall-run chinook salmon and steelhead only when alternative measures are insufficient to permit recovery of the populations.
		Minimize further threats of hatchery-reared fish contaminating wild stocks of chinook salmon and steelhead.	E095902	Adopt methods for selecting spawning adults for the hatchery from an appropriate cross section of the adult population available to the hatchery.
	Minimize further threats of hatchery-reared fish contaminating wild stocks of chinook salmon and steelhead.	E095903	Develop a collaborative program to coded-wire tag a representative proportion of all Nimbus Hatchery fall-run chinook salmon.	

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Sacramento River	Reduce losses of fish and wildlife resulting from pesticide, hydrocarbon, heavy metal, and other pollutants in the Sacramento River.	E035702	Develop a cooperative program to remedy heavy metal pollution from IMM to meet basin plan standards and implement reliable and proven remedies that ensure continued treatment and control of heavy metal waste before water is discharged to the Sacramento River.
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Sacramento River	Reduce losses of fish and wildlife resulting from pesticide, hydrocarbon, heavy metal, and other pollutants in the Sacramento River.	E035703	Develop a cooperative program to eliminate scouring of toxic metal-laden sediments in the Spring Creek and Keswick Reservoirs.
			E035704	Control contaminant input to the Sacramento River system by constructing and operating stormwater treatment facilities and implementing industrial best management practices (BMPs) for stormwater and erosion control.
	American River Basin	Reduce the application of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife on agricultural lands that have the greatest risk to fish and wildlife populations.	E095701	Enter into conservation easements with willing landowners to modify agricultural practices in ways to reduce loads and concentrations of contaminants.
			E095702	Provide incentives to landowners to modify agricultural or other land use practices that contribute to the input of contaminants into waterways.

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Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
	Yolo Basin	Restore and maintain water quality in the Cache Creek watershed.	E105701	Identify the sources and reduce the amounts of mercury and other contaminants coming into the watershed from upstream sources.
		Restore and maintain water quality in the Putah Creek watershed.	E105702	Develop and implement a Streamkeeper program on Putah Creek.
Proposed Water Quality Program Actions				
Q1 Reduction of oxygen-depleting substances in the aquatic environment.	American River Basin	Reduce sediment loads that cause low inter-substrate dissolved oxygen concentrations that affect salmon spawning and rearing habitat and establish full salmon spawning and rearing activity.	Q090101	Possible management actions include gravel enhancement programs, channel restoration programs, development of river-corridor assessments and management strategies, and regulation of high water temperature reservoir releases.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	American River Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q090201	Control algal blooms in upstream reservoirs and aquatic weed growth in the lower American River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			Q090202	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3 Reduction of mercury loadings in water and sediment.	American River Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q090301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
Proposed Water Quality Program Actions				
Q3 Reduction of mercury loadings in water and sediment.	American River Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q090302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.
Q4 Reduction of pesticide loadings in the aquatic environment.	American River Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q090501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	American River Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q090801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	American River Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q090802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Butte Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q070201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3 Reduction of mercury loadings in water and sediment.	Butte Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q070301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
		Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q070302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	Butte Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q070501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Butte Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q070801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
		Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q070802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Colusa Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q060201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Proposed Water Quality Program Actions				
Q3 Reduction of mercury loadings in water and sediment.	Colusa Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q060301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
			Q060302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	Colusa Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q060501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Colusa Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q060801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q060802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Cottonwood Creek	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q050201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3 Reduction of mercury loadings in water and sediment.	Cottonwood Creek	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q050301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
			Q050302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	Cottonwood Creek	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q050501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Cottonwood Creek	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q050801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Cottonwood Creek	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q050802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions				
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Feather River/Sutter Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q080201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3 Reduction of mercury loadings in water and sediment.	Feather River/Sutter Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q080301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
			Q080302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	Feather River/Sutter Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q080501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Feather River/Sutter Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q080801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q080802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	North Sacramento Valley	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q040201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3 Reduction of mercury loadings in water and sediment.	North Sacramento Valley	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q040301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
			Q040302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4 Reduction of pesticide loadings in the aquatic environment.	North Sacramento Valley	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q040501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	North Sacramento Valley		Q040801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions				
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	North Sacramento Valley	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q040802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Sacramento River	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q030201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q3 Reduction of mercury loadings in water and sediment.	Sacramento River	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q030301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
Q3 Reduction of mercury loadings in water and sediment.	Sacramento River	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q030302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.
Q4 Reduction of pesticide loadings in the aquatic environment.	Sacramento River	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q030501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Sacramento River	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q030801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q3 Reduction of mercury loadings in water and sediment.	Yolo Basin	Reduce mercury in water and sediment to levels which do not adversely affect aquatic organisms, wildlife and human health.	Q100301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time-frame for expected results.
			Q100302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.
Q4 Reduction of pesticide loadings in the aquatic environment.	Yolo Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q100501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table C: Sacramento River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	Yolo Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q100801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q100802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Water Use Efficiency Program ¹				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W3. Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies.	All zones.	None.	None.	None.
W4. Support development and implementation of water recycling projects.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Transfer Program ¹				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	All zones.	None.	None.	None.
Watershed Management Program ¹				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	All zones.	None.	None.	None.
Storage Facilities Program				

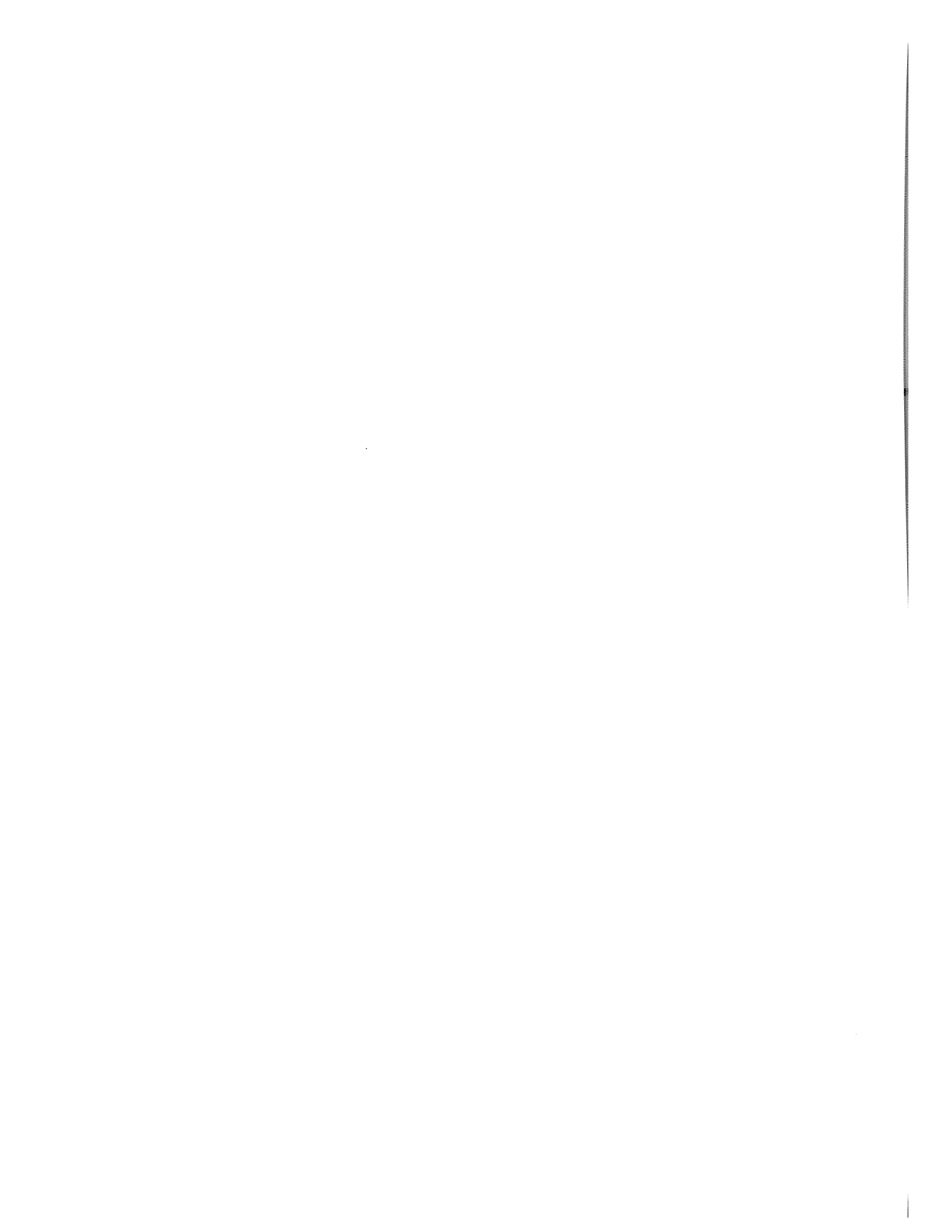
¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
S1. Construct and operate enlarged or new surface storage facilities.	Eastside Delta Tributaries, East San Joaquin Basin, and West San Joaquin Basin Zones.	None.	None.	None.
S2. Construct and operate new groundwater storage facilities.	Eastside Delta Tributaries, East San Joaquin Basin, and West San Joaquin Basin Zones.	None.	None.	None.
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
02. Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.



Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program¹				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Eastside Delta Tributaries	For the Cosumnes River, where a natural streamflow pattern presently exists with natural winter and spring streamflows, the target is to maintain or restore summer and fall base flows.	E110101	Improve summer and fall base flows on the Cosumnes River by developing new water supplies along the river and by purchases from willing sellers.
			E110102	Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Cosumnes River, and review water allocation for the entire basin.
			E110103	Cooperatively develop a groundwater replenishment program to raise the water table in the Cosumnes River floodplain.
		The target for the Mokelumne River is to provide conditions to maintain the fishery and riparian resources in good condition by implementing and evaluating the flow regime in the Principles of Agreement (POA) for Mokelumne River. The POA provides increased flows below Camanche Dam beyond present requirements, which will benefit the fishery and riparian resources of the lower Mokelumne River.	E110104	Provide target flows for the Mokelumne Rivers from storage releases, but only if there is sufficient inflows into storage reservoirs and carryover storage to meet target levels. The additional water would be obtained from developing new water supplies within the Central Valley basin, water transfers, and willing sellers of water.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>Eastside Delta Tributaries</p>	<p>The target for the Mokelumne River is to provide conditions to maintain the fishery and riparian resources in good condition by implementing and evaluating the flow regime in the Principles of Agreement (POA) for Mokelumne River. The POA provides increased flows below Camanche Dam beyond present requirements, which will benefit the fishery and riparian resources of the lower Mokelumne River.</p>	<p>E110105</p>	<p>Maintain or enhance summer and fall base flows on the Mokelumne River by developing new water supplies along the river and by purchases from willing sellers.</p>
		<p>The target also is to provide enhanced streamflows below Woodbridge Dam by providing minimum flows recommended by DFG in dry years: 200 cfs from November 1 through April 14; 250 cfs from April 15 through April 30; 300 cfs in May; and 20 cfs from June 1 through October 31. In normal years, minimum flows should be 250 cfs from October 1 through October 14; 300 cfs from October 15 through February 29; 350 cfs during March; 400 cfs during April; 450 cfs during May; 400 cfs during June; 150 cfs during July; and 100 cfs during August and September. In wet years, minimum flows should be 300 cfs from June 1 through October 14; 350 cfs from October 15 through February 29; 400 cfs in March; and 450 cfs during April and May.</p>	<p>E110106</p>	<p>Cooperatively evaluate the potential for minimizing water supply impacts by replacing the diversions at Woodbridge with other Delta diversions.</p>
			<p>E110107</p>	<p>Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Mokelumne.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		For the Calaveras River, where the natural streamflow has been greatly altered, streamflows should be enhanced below New Hogan Dam by the minimum flows recommended by DFG.	E110108	Provide target flows for the Calaveras River from storage releases, but only if there is sufficient inflows into storage reservoirs and carryover storage to meet target levels. The additional water would be obtained from developing new water supplies within the Central Valley basin, water transfers, and willing sellers of water.
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Eastside Delta Tributaries	For the Calaveras River, where the natural streamflow has been greatly altered, streamflows should be enhanced below New Hogan Dam by the minimum flows recommended by DFG.	E110109	Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Calaveras River.
			E110110	A flow event should be provided in late February or early March, averaging 100 to 200 cfs in dry years, 300 to 400 cfs in normal years, and 600 to 800 cfs in wet years. Such flows would be provided only when inflows to New Hogan Reservoir are at these levels.
		Restore gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.	E110205	Develop a cooperative program to provide late winter or early spring flow events as needed, to establish appropriate flushing/channel maintenance flows.
		Maintain mean daily water temperatures at or below levels suitable for maintenance of all life stages of fall-run chinook salmon and steelhead resources.	E110502	Establish minimum pool size at New Hogan Reservoir to ensure cold-water releases into the Calaveras River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
	San Joaquin River	Manage flow releases from tributary streams to provide adequate upstream and downstream passage of fall-run and late-fall-run chinook salmon, rainbow trout, and steelhead and spawning and rearing habitat for American shad, splittail, and sturgeon from the Merced River confluence to Vernalis.	E120101	Develop a cooperative program to purchase water from willing sellers or develop alternative sources of water.
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	East San Joaquin Basin	Maintain the following base flows in the Tuolumne River below Don Pedro Dam: in critical and below years, flow releases should be 50 cfs from June through September, 100 cfs from October 1-15, 150 cfs from October 16-May 31, plus an 11,091 acre-foot outmigration pulse flow; in median critical dry years, flow releases should be 50 cfs from June through September, 100 cfs from October 1-15, 150 cfs from October 16-May 31, plus an 20,091 acre-foot outmigration pulse flow; in intermediate critical dry years, flow release should be 50 cfs from June through September, 150 cfs from October 1-15, 150 cfs from October 16-May 31, plus a 32,619 acre foot outmigration pulse flow; in median dry years flow release should be 75 cfs from June through September, 150 cfs from	E130103	Develop a cooperative approach to coordinate flow releases to attain target levels.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		<p>October 1-15, 150 cfs from October 16-May 31, plus a 37,060 acre-foot outmigration pulse flow; in intermediate dry below-normal years, flow release should be 75 cfs from June through September, 180 cfs from October 1-15, 180 cfs from October 16-May 31, plus a 35,920 acre-foot outmigration pulse flow and a 1,676 acre-foot attraction pulse flow; in median below normal years, flow releases should be 75 cfs from June through September, 200 cfs from October 1-15, 175 cfs from October 16-May 31, plus a 60,027 acre-foot outmigration pulse flow and a 1,736 acre-foot attraction pulse flow; and, in all other year types, flow releases should be 250 cfs from June through September, 300 cfs from October 1-15, 300 cfs from October 16-May 31, plus a 89,882 acre-foot outmigration pulse flow and a 5,950 acre-foot attraction pulse flow.</p>		
<p>E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.</p>	<p>East San Joaquin Basin</p>	<p>Maintain the following base flows in the Stanislaus River below Goodwin Dam: in critical, dry, and below-normal years, minimum flows should be 200 to 300 cfs except for a flow event of 1,500 cfs for 30 days in April and May; in above-normal years, minimum flows should be 300 to 350 cfs except for 800 cfs in June and 1,500 cfs in April and May; and in wet years, minimum flows should be 300 to 400 cfs except for 1,500 cfs from April through June.</p>	<p>E130101</p>	<p>Develop a cooperative approach to coordinate flow releases to attain target levels.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Provide the following 10-day spring flow events on the Stanislaus River: 2,500 to 3,000 cfs in late April or early May in normal years, 3,000 to 4,000 cfs in wet years. Such flows would be provided only when inflows to New Melones Reservoir are at these levels.	E130102	Develop a cooperative approach to coordinate flow releases to attain target levels.
		Maintain the following base flows in the Merced River below Lake McClure: in dry years, minimum instream flows at Shaffer Bridge should be 15 cfs from June through October 15, 60 cfs from October 16 through October 31 and January through May, and 75 cfs in November and December and in normal years, minimum instream flows at Shaffer Bridge should be 25 cfs from June through October 15, 75 cfs from October 16 through October 31 and January through May, and 100 cfs in November and December.	E130104	Develop a cooperative approach to coordinate flow releases to attain target levels.
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	East San Joaquin Basin	Provide the following 10-day spring flow events on the Merced River: 1,000 to 1,500 cfs in late April or early May in dry years, 2,000 to 2,500 cfs in normal years, and 3,000 to 4,000 cfs in wet years. Such flows would be provided only when inflows to Lake McClure are at these levels.	E130105	Develop a cooperative approach to coordinate flow releases to attain target levels.

Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
	West San Joaquin	Provide flows of suitable quality water that more closely emulate natural annual and seasonal streamflow patterns in West San Joaquin tributary watersheds. Provide a total watershed flow of 250 to 500 cfs to the San Joaquin River in dry and normal years for a 10-day period in Late April to early May (approximately 5000 to 10,000 acre-feet).	E140101	Enter into agreements with water districts and wetland managers to provide return flows of high quality water from irrigated agriculture and seasonal wetlands to the San Joaquin River.
			E140102	Enter into agreements with landowners and water districts to limit diversions of natural flows from streams to improve streamflows.
			E140103	Make seasonal releases from the California Aqueduct or Delta Mendota Canal into streams and wetlands.
			E140104	Limit capture of natural stream flows from west side tributaries into irrigation canals and ditches, and State and federal aqueducts.
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Eastside Delta Tributaries	On the Mokelumne River below Camanche Dam provide for the annual supplementation of 1,200 to 2,500 cubic yards of gravel into the active stream channel to maintain quality spawning areas and to replace gravel that is transported downstream.	E110201	Develop a cooperative program to evaluate, implement, and monitor a sediment supplementation on the Mokelumne River in a manner consistent with adaptive management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Eastside Delta Tributaries	On the Calaveras River provide for the annual recruitment of 500 to 1,000 cubic yards of gravel into the active stream channel.	E110202	Cooperatively develop a program to protect all existing sources of gravel recruitment to the rivers.
			E110203	Develop a cooperative program to supplement gravel with artificial introductions.
			E110204	Develop a cooperative program with the aggregate resource industry to improve extraction activities within the Mokelumne River floodplain.
		Restore gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.	E110205	Develop a cooperative program to provide late winter or early spring flow events as needed, to establish appropriate flushing/channel maintenance flows.
			E110206	Facilitate transport of fine sediments by restoring as necessary the river channel configuration so that it is consistent with planned flow regime and available sediment supply.
			E110207	Develop a cooperative program to improve the flexibility of upstream reservoir management to <i>minimize</i> fine sediment inputs to the lower Mokelumne and Calaveras Rivers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Eastside Delta Tributaries	Restore gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.	E110208	Develop a cooperative evaluation of mechanically cleaning spawning gravel at selected sites in lower Mokelumne and Calaveras Rivers.
			E110209	Develop a cooperative program on the Cosumnes River to relocate sand and gravel extraction activities to areas beyond the natural stream meander corridor.
	East San Joaquin Basin	Reduce existing levels of erosion and maintain gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E130201	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Stanislaus River. If indicated, renovate or supplement gravel supplies to enhance substrate quality by importing additional gravel as conditions require.
			E130202	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Tuolumne River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.
			E130203	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Merced River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.

Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).</p>	<p>East San Joaquin Basin</p>	<p>Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.</p>	<p>E130301</p>	<p>Acquire riparian and meander zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.</p>
			<p>E130302</p>	<p>Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.</p>
			<p>E130303</p>	<p>Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.</p>
		<p>On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.</p>	<p>E130304</p>	<p>Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).</p>	<p>East San Joaquin Basin</p>	<p>On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.</p>	<p>E130305</p>	<p>Work with permitting agencies to appropriately condition future gravel extraction permits. Coordinate the design and implementation of gravel pit isolation and stream channel configuration with the Corps, local water management agencies, and local governments.</p>
			<p>E130306</p>	<p>Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.</p>
			<p>E130307</p>	<p>Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in inchannel gravel extraction areas.</p>
		<p>Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.</p>	<p>E130402</p>	<p>Restore as needed stream channel and overflow basin configurations within the floodplain.</p>
		<p>Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.</p>	<p>E135601</p>	<p>Eliminate gravel pits within or connected to the rivers.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	West San Joaquin	Restore 10 to 25 miles of stream channel, stream meander belts, and flood plain processes along west-side tributaries of the San Joaquin River.	E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.
			E140403	Reduce or eliminate gravel mining from active stream channels.
E6. Restoration and maintenance of riverine aquatic habitats.	Eastside Delta Tributaries	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E110401	Restore as needed stream channel and overflow basin configurations within the floodplain.
			E110401	Minimize effects of permanent structures, such as bridges and diversion dams, on floodplain processes.
	East San Joaquin Basin	Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130301	Acquire riparian and meander zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.
			E130302	Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
E6. Restoration and maintenance of riverine aquatic habitats.	East San Joaquin Basin	On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.	E130304	Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.
			E130305	Work with permitting agencies to appropriately condition future gravel extraction permits. Coordinate the design and implementation of gravel pit isolation and stream channel configuration with the Corps, local water management agencies, and local governments.
			E130306	Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.
			E130307	Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in inchannel gravel extraction areas.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E130402	Restore as needed stream channel and overflow basin configurations within the floodplain.
		Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.	E135601	Eliminate gravel pits within or connected to the rivers.
E6. Restoration and maintenance of riverine aquatic habitats.	East San Joaquin Basin	Provide conditions for growth of riparian vegetation along sections of rivers in the East San Joaquin Basin Ecological Zone.	E131601	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Stanislaus River.
			E131602	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Tuolumne River.
			E131603	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Merced River.
	West San Joaquin	Restore 10 to 25 miles of stream channel, stream meander belts, and flood plain processes along west-side tributaries of the San Joaquin River.	E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E140402	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.
			E140403	Reduce or eliminate gravel mining and stream bed altering from active stream channels.
E13d. Protection and enhancement of up to 172,800 acres of seasonal wetlands in the San Joaquin River Ecological Management Zone and protection and enhancement of existing seasonal wetlands elsewhere in the San Joaquin River Region.	Eastside Delta Tributaries	Protect existing seasonal wetland habitat through fee acquisition or perpetual easements.	E111501	Develop and implement a cooperative program to improve management of existing, degraded seasonal wetland habitat.
	San Joaquin River	Assist in protecting 52,500 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E121501	Develop and implement a cooperative program to improve management of 52,500 acres of existing, degraded, seasonal wetland habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Develop and implement a cooperative program to enhance 120,300 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E121502	Improve and manage seasonal wetland habitat throughout the ecological management zone.
	West San Joaquin Basin	Evaluate the feasibility of creating or improving seasonal wetland habitats.	E141501	Acquire lands adjacent to existing seasonal wetlands from willing sellers or conservation easements.
		Provide 150,000 acre-feet of water to existing wetlands to improve waterfowl habitat.	E141502	Provide water to wetlands on a seasonal basis from the California Aqueduct, Delta-Mendota Canal, or other source.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	Eastside Delta Tributaries	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E110401	Restore as needed stream channel and overflow basin configurations within the floodplain.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River and protect existing riparian habitat.	E111601	Develop a cooperative program to restrict further riparian vegetation removal, and establish a riparian corridor protection zones.
			E111602	Develop a cooperative program to implement riparian restoration activities.
			E111603	Encourage improved land management practices and livestock grazing practices along stream riparian zones.
			E111604	Purchase streambank conservation easements from willing sellers to widen riparian corridors.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River and protect existing riparian habitat.	E111605	Develop a cooperative program to restore riparian woodlands along the entire Mokelumne River.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111606	Develop a cooperative program to restrict further riparian vegetation removal, and establish a riparian corridor protection zones.
			E111607	Develop a cooperative program to implement riparian restoration activities.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111608	Encourage improved land management practices and livestock grazing practices along stream riparian zones.
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	Eastside Delta Tributaries	Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111609	Purchase streambank conservation easements from willing sellers to widen riparian corridors.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111610	Develop a cooperative program to restore riparian woodlands along the entire Calaveras River.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Cosumnes River and protect existing riparian habitat.	E111611	Develop a cooperative program to restrict further riparian vegetation removal, and establish a riparian corridor protection zones.
			E111612	Develop a cooperative program to implement riparian restoration activities.
			E111613	Encourage improved land management practices and livestock grazing practices along stream riparian zones.
			E111614	Purchase streambank conservation easements from willing sellers to widen riparian corridors.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Cosumnes River and protect existing riparian habitat.	E111615	Develop a cooperative program to restore riparian woodlands along the entire Cosumnes River.
		Reduce the adverse effects of invasive riparian plants on native species and ecosystem processes, water quality and conveyance systems, and major rivers and their tributaries.	E115301	Develop and implement a coordinated control program to reduce or eliminate exotic invasive plant species from the riparian corridor along the Cosumnes, Mokelumne, and Calaveras Rivers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	San Joaquin River	Restore 50 stream miles of diverse, self-sustaining riparian community.	E121601	Develop a cooperative program to restrict further removal of riparian vegetation.
	E121602	Develop a cooperative program to restore riparian habitat.		
	E121603	Improve land management and livestock grazing practices along streams and riparian zones.		
	Set back 10 miles of levees along the San Joaquin River between the Merced River confluence and Vernalis where feasible to reestablish the hydrologic connectivity between these channels and natural floodplains.	E124901	Develop a cooperative program to acquire or obtain easements on floodplain and riparian land needed to meet restoration goals.	
	East San Joaquin Basin	Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130301	Acquire riparian and meander zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.
E130302	Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.			

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E130303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	East San Joaquin Basin	On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.	E130304	Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.
		On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.	E130305	Work with permitting agencies to appropriately condition future gravel extraction permits. Coordinate the design and implementation of gravel pit isolation and stream channel configuration with the Corps, local water management agencies, and local governments.
		On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5 to 7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15 to 30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6 to 9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.	E130306	Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E130307	Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in inchannel gravel extraction areas.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E130401	Restore as needed stream channel and overflow basin configurations within the floodplain.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.</p>	<p>East San Joaquin Basin</p>	<p>Provide conditions for growth of riparian vegetation along sections of rivers in the East San Joaquin Basin Ecological Zone.</p>	<p>E131601</p>	<p>Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Stanislaus River.</p>
		<p>E131602</p>	<p>Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Tuolumne River.</p>	
		<p>E131603</p>	<p>Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Merced River.</p>	
		<p>Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213 to 312 individuals.</p>	<p>E134101</p>	<p>Reestablish 500 acres of large contiguous areas of riparian forest habitat that have dense brushy understories with adjacent upland habitat. These restored/reestablished riparian forests would have adjacent upland habitat with sufficient cover. Establish five additional populations within the species historical range; each population should have self-sustaining populations with a minimum of 250 individuals each. Maintain and establish connectivity between key habitats.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E134103	More closely approximate the natural hydrologic regime which allows for establishment and maintenance of mature riparian forest habitat. Additionally, encourage growth of wild rose, coyote bush, blackberries, box elder, valley oak, and cottonwoods to provide habitat.
E15d. Restore up to 4,720 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; restoration of up to 75 miles of riparian habitat along the San Joaquin River and its tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	West San Joaquin	Restore 10 to 25 miles of stream channel, stream meander belts, and flood plain processes along west-side tributaries of the San Joaquin River.	E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.
		E140402	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.	
		E140403	Reduce or eliminate gravel mining and stream bed altering from active stream channels.	
		Restore 5 miles of riparian habitat totaling 500 to 1,000 acres.	E141601	Restore riparian forest habitat on lands purchase land from willing sellers or obtained via conservation easements.

Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18c. Cooperative management of up to 15,290 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	San Joaquin River	Cooperatively enhance 15,290 acres of private agricultural land to support nesting and wintering waterfowl consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	121901	Increase the area of rice fields and other crop lands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
	West San Joaquin Basin	Restore and maintain migration corridors of native plants of more than one mile in width.	141901	Purchase land or conservation easements on which to restore wildlife habitat to connect existing grassland or agricultural wildlife habitat.
E22. Reduction in the adverse effects of diversions on fish.	Eastside Delta Tributaries	Install fish screens representing the best available technology and operational constraints, as necessary, to minimize losses in diversions that limit the recovery of fish populations.	E114701	Consolidate diversions, seek alternative water sources, and install a permanent fish screen at North San Joaquin Conservation District diversion on the lower Mokelumne River.
		Install fish screens representing the best available technology and operational constraints, as necessary, to minimize losses in diversions that limit the recovery of fish populations.	E114702	Improve fish screens and fish bypass system at Woodbridge Dam on the lower Mokelumne River.
			E114703	Develop a cooperative program to operate temporary screens at diversions where juvenile salmon rear or during seasons when they pass the diversion site.
			E114704	Consolidate and install screens on diversions in the Cosumnes River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
	San Joaquin River	Reduce entrainment of fish and other aquatic organisms into diversions by 50%, by volume, from the Merced River confluence to Vernalis.	E124701	Develop a cooperative approach to install state-of-the-art fish screens at El Solyo, Patterson, and West Stanislaus Irrigation District diversions.
		Eliminate the loss of adult fall-run chinook salmon straying into the San Joaquin River upstream of the Merced River confluence.	E124702	Continue annually installing a temporary weir on the San Joaquin River immediately upstream from the confluence with the Merced River to block adult salmon migration.
	East San Joaquin	Reduce entrainment of fish and other aquatic organisms into diversions to a level that will not impair restoration of salmon and steelhead by screening 50% of the water diverted, by volume, in the basin.	E134701	Improve the efficiency of existing diversion screens on the lower Merced River.
E22. Reduction in the adverse effects of diversions on fish.	East San Joaquin	Reduce entrainment of fish and other aquatic organisms into diversions to a level that will not impair restoration of salmon and steelhead by screening 50% of the water diverted, by volume, in the basin.	E134702	Provide alternative sources of water to diverters legally diverting water from spawning and rearing areas of the three streams.
			E134703	Purchase water rights from diverters whose diversions entrain significant numbers of juvenile salmon or steelhead.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying by reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Improve anadromous fish passage at dams and diversion structures.	E114801	Cooperatively improve fish passage at WID diversions and Lake Lodi on the lower Mokelumne River.
			E114802	Cooperative isolate the City of Lodi's Recreational Lake Lodi on the lower Mokelumne River to improve adult salmon and steelhead passage and juvenile fish survival.
			E114803	Develop a cooperative program to provide fish passage at temporary irrigation dams in the Calaveras River, Mormon Slough, and the Stockton Diverting Canal.
			E114804	Develop a cooperative program to install fish passage facilities at Bellota Weir, Clements Dam, and Cherryland Dam on the Calaveras River and provide passage flows.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying by reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Eliminate the loss of adult fall-run chinook salmon that stray into the San Joaquin River upstream of the Merced River confluence.	E134801	Develop a cooperative program to eliminate blockage of upstream-migrating fall-run chinook salmon and steelhead at temporary irrigation diversion dams erected during the irrigation season.
			E134802	Continue annual installation of a temporary weir on the San Joaquin River immediately upstream of the confluence with the Merced River to block adult salmon migration.
		Reduce level of predation on juvenile salmonids below Woodbridge Dam on the lower Mokelumne River.	E115601	Develop a cooperative program modify the stream channel and to rebuild the Woodbridge Dam fish passage and diversion screening facilities to minimize losses of downstream migrating salmon and steelhead while maintaining other important attributes.
			E115602	Modify and improve the fish bypass discharge at Woodbridge Dam.
		Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.	E135601	Eliminate gravel pits within or connected to the rivers.

Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Develop harvest management strategies that allow the spawning population of wild, naturally produced fish to attain levels that fully utilize existing and restored habitat and allow harvest to be focused on hatchery-produced fish.	E115801	Reduce or eliminate the illegal harvest of salmon and steelhead by increasing enforcement efforts.
			E115802	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-produced fish and instituting a selective fishery.
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying by reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Develop harvest management strategies that allow the spawning population of wild, naturally produced fish to attain levels that fully utilize existing and restored habitat and allow harvest to be focused on hatchery-produced fish.	E135801	Control illegal harvest through increased enforcement efforts.
			E135802	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-produced fish and instituting a selective fishery.
		Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	E115901	Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.
			E115902	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
			E115903	Develop a plan to phase out the importation of egg or fry chinook salmon and steelhead to the Mokelumne River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
		Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	E135901	Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.
			E135902	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Eastside Delta Tributaries	Restore and maintain water quality in Camanche Reservoir on the Mokelumne River.	E115701	Support EBMUD in developing operating regimes at Pardee and Camanche Reservoirs that optimize water quality below Camanche Dam.
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Eastside Delta Tributaries	Restore and maintain water quality in Camanche Reservoir on the Mokelumne River.	E115702	Support implementation of the cooperative agreement for the long-term remediation of Penn Mine.
			E115703	Develop an integrated program to coordinate and minimize agricultural pesticide and herbicide use in areas that drain into the Mokelumne River.
		Reduce the input of nonpoint source contaminants into the Mokelumne River.	E125701	Provide additional funding to enforce State laws regarding point- and nonpoint-source pollution.
			E125702	Develop a cooperative program to strengthen water quality standards as needed.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E29. Enhancement of habitat conditions for the riparian brush rabbit in occupied habitat areas at and near Caswell State Park on the Stanislaus River.	East San Joaquin Basin	Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213 to 312 individuals.	E134101	Reestablish 500 acres of large contiguous areas of riparian forest habitat that have dense brushy understories with adjacent upland habitat. These restored/reestablished riparian forests would have adjacent upland habitat with sufficient cover. Establish five additional populations within the species historical range; each population should have self-sustaining populations with a minimum of 250 individuals each. Maintain and establish connectivity between key habitats.
			E134102	Prohibit ground cover and litter removal to allow for dense brushy and herbaceous areas of a minimum size of 550 square yards within the riparian forest.
E29. Enhancement of habitat conditions for the riparian brush rabbit in occupied habitat areas at and near Caswell State Park on the Stanislaus River.	East San Joaquin Basin	Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213 to 312 individuals.	E134103	More closely approximate the natural hydrological regime which allows for establishment and maintenance of mature riparian forest habitat. Additionally, encourage growth of wild rose, coyote bush, blackberries, elderberries, wild grape, box elder, valley oak, and cottonwoods to provide habitat.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			E134104	Provide high ground adjacent to current and expanded habitat with cover for protection from floods. Existing flood control levees adjacent to the Park could be utilized for this escape habitat in this area to provide sufficient vegetative growth of grasses, forbs, and shrubs to lower predation pressure during these times.
			E134105	Provide fire breaks around current and expanded habitat to protect habitat destruction due to wildfire and control feral cat and dog population with yearly control efforts within and adjacent to the Park. Prohibit dogs within Caswell Memorial State Park.
Water Quality Program ¹				
Q4 Reduction of pesticide loadings in the aquatic environment.	San Joaquin River	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q120501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q5 Management of salinity levels in the aquatic environment to improve water quality.	San Joaquin River	Reduce or manage salinity in the San Joaquin River (SJR) and in the Delta Region to meet water quality objectives by such means as relocating points of drainage discharge, improving flow patterns using flow barriers, reducing and managing drainage water, reducing salts discharged to these water bodies, real-time management and utilizing assimilative capacity of the River through the Delta-Mendota Canal circulation.	Q120601	Reduce agricultural drainage water volume through improving management of irrigation systems; adopting new or improving existing irrigation practices, including shortening furrows; and improving irrigation scheduling.
			Q120602	Prepare salt reduction plans for each source of TDS (prepare water conservation plans and drainage and wastewater operation plans); provide incentives for water conservation and drainage water use; improve irrigation methods, irrigation management, and sequential reuse of drainage water (to improve water use efficiency); and use sprinkler irrigation combined with furrow irrigation to reduce drainage volume to reduce short term salt loading.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	San Joaquin River	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q120801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
		Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q120802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q1 Reduction of oxygen-depleting substances in the aquatic environment.	East San Joaquin Basin	Eliminate the low inter-substrate dissolved oxygen concentrations that affect salmon spawning and rearing habitat and establish full salmon spawning and rearing activity.	Q130101	Possible management actions include gravel enhancement programs, channel restoration programs, development of river-corridor assessments and management strategies, and regulation of high water temperature reservoir releases.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	East San Joaquin Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q130201	Establish a watershed management program for the San Joaquin River.
Q4 Reduction of pesticide loadings in the aquatic environment.	East San Joaquin Basin	Reduce concentrations of OC pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q130501	Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q5 Management of salinity levels in the aquatic environment to improve water quality.	East San Joaquin Basin	Reduce or manage salinity in the San Joaquin River (SJR) and in the Delta Region to meet water quality objectives by such means as relocating points of drainage discharge, improving flow patterns using flow barriers, reducing and managing drainage water, reducing salts discharged to these water bodies, real-time management and utilizing assimilative capacity of the River through the Delta-Mendota Canal circulation.	Q130601	Reduce agricultural drainage water volume through improving management of irrigation systems; adopting new or improving existing irrigation practices, including shortening furrows; and improving irrigation scheduling.
			Q130602	Prepare salt reduction plans for each source of TDS (prepare water conservation plans and drainage and wastewater operation plans); provide incentives for water conservation and drainage water use; improve irrigation methods, irrigation management, and sequential reuse of drainage water (to improve water use efficiency); and use sprinkler irrigation combined with furrow irrigation to reduce drainage volume to reduce short term salt loading.
Q7 Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	East San Joaquin Basin	Reduce metal loading of the Bay Delta and its tributaries to levels which do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q130801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q130802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q8 Reduction of sediment loadings to levels which do not adversely effect beneficial uses of surface water.	East San Joaquin Basin	Reduce sediment in areas to the degree that sediment does not cause negative impacts to beneficial uses of the surface water, including ecosystem benefits and municipal uses.	Q130901	Develop and implement land use BMPs, particularly along tributary watercourses, to reduce soil erosion and fine sediment inputs.
		Reduce sediment in areas to the degree that sediment does not cause negative impacts to beneficial uses of the surface water, including ecosystem benefits and municipal uses.	Q130902	Manage floodplains to help diminish the negative impact of fine sediment loads from anthropogenic sources by facilitating natural deposition on floodplain surfaces.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	West San Joaquin Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q140201	Implement a watershed management program within the South Bay Aqueduct proper.
			Q140202	Develop and implement watershed management programs for Clifton Court and Bethany Reservoir to address nutrients and pathogens.
			Q140203	Establish a watershed management program for the San Joaquin River.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
<p>Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.</p>	<p>West San Joaquin Basin</p>	<p>Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.</p>	<p>Q140204</p>	<p>Control drainage of stormwaters into the aqueduct by physical modification of facilities.</p>
			<p>Q140205</p>	<p>Develop and implement a watershed management program to minimize drainage into aqueduct.</p>
			<p>Q140501</p>	<p>Support conservation efforts to help achieve the Water Quality Program objectives. On-farm conservation practices could include installation or implementation of the following features: tailwater ditch tarps; land leveling; cutback stream; surge irrigation; sprinkler germination; drip irrigation; shorten length of run; gated surface pipe; vegetated filter strip; cover crop; grassed waterway; conservation tillage; sediment basin; tailwater return system; irrigation management; nutrient management; integrated pest management; and tailwater management.</p>
			<p>Q140502</p>	<p>Support projects which will recreate the stream channels and increase the size of flow structures, such as culverts, to help achieve reduction in OC pesticides.</p>

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			Q140601	Reduce agricultural drainage water volume through improving management of irrigation systems; adopting new or improving existing irrigation practices, including shortening furrows; and improving irrigation scheduling.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	West San Joaquin Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q140602	Prepare salt reduction plans for each source of TDS (prepare water conservation plans and drainage and wastewater operation plans); provide incentives for water conservation and drainage water use; improve irrigation methods, irrigation management, and sequential reuse of drainage water (to improve water use efficiency); and use sprinkler irrigation combined with furrow irrigation to reduce drainage volume to reduce short term salt loading.
			Q140701	Treat agricultural drainage water to remove selenium through processes which include ion exchange, reverse osmosis, reduction with zero-valent iron, reduction with ferrous hydroxide, reduction with bacteria and other algal-bacterial treatments, phytoremediation in agricultural drainage reuse systems, volatilization from evaporation ponds and drainage reuse systems, and flow-through wetlands.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			Q140702	Encourage the development and use of alternative cropping and irrigation practices that will reduce subsurface drainage volumes as well as selenium discharges.
			Q140703	Encourage and support the use of a tradable loads program, as well as other economic incentives such as tiered-water pricing, as a means to achieve selenium load reductions. The CALFED program should work with the Grassland Area Farmers to build upon the results of their program.
Q2 Maintain pathogen loadings or below mandated levees and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	West San Joaquin Basin	Decrease levels of nutrients, pesticides, pathogens, non-seawater TDS, and TOC in drinking water supplies.	Q140704	Implement a program to retire lands to help meet water quality objectives for selenium under a tiered approach if needed to achieve selenium loading reduction objectives, initially, up to 3,000 acres of lands with the greatest concentrations of selenium present in agricultural drainage would be targeted for retirement, and if, 3,000 acres is still inadequate to meet program goals, retirement would be expanded up to a total of 37,400 acres of lands with high selenium concentrations.
			Q140705	Reduce selenium loads from refineries to reduce selenium concentrations in biota to levels below human health advisories.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
			Q140706	Reduce selenium loads from refineries to reduce selenium concentrations in biota to levels below ecological risk guidelines.
			Q140707	Reduce selenium loads from refineries by 90 percent by the year 2001 through treatment of waste streams, use of alternative crude oil, sour water reuse, and wetland discharge treatment.
			Q140801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q140802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Water Use Efficiency Program ¹				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	All zones.	None.	None.	None.
W3. Provide planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and best management practices to urban water agencies.	All zones.	None.	None.	None.
W4. Support development and implementation of water recycling projects.	All zones.	None.	None.	None.
Water Transfer Program ¹				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Table D: San Joaquin River Region: Proposed CALFED Actions Evaluated in the MSCS

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Watershed Management Program ¹				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	All zones.	None.	None.	None.
Storage Facilities Program				
S1. Construct and operate enlarged or new surface storage facilities.	Eastside Delta Tributaries, East San Joaquin Basin, and West San Joaquin Basin Zones.	None.	None.	None.
S2. Construct and operate new groundwater storage facilities.	Eastside Delta Tributaries, East San Joaquin Basin, and West San Joaquin Basin Zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	All zones.	None.	None.	None.
02. Implement an Environmental Water Account to provide operational flexibility to achieve environmental benefits.	All zones.	None.	None.	None.

¹ Program targets and actions are derived from the February 1999 revised CALFED Program plans.



Attachment 3

Evaluated Species Associated with NCCP Habitats

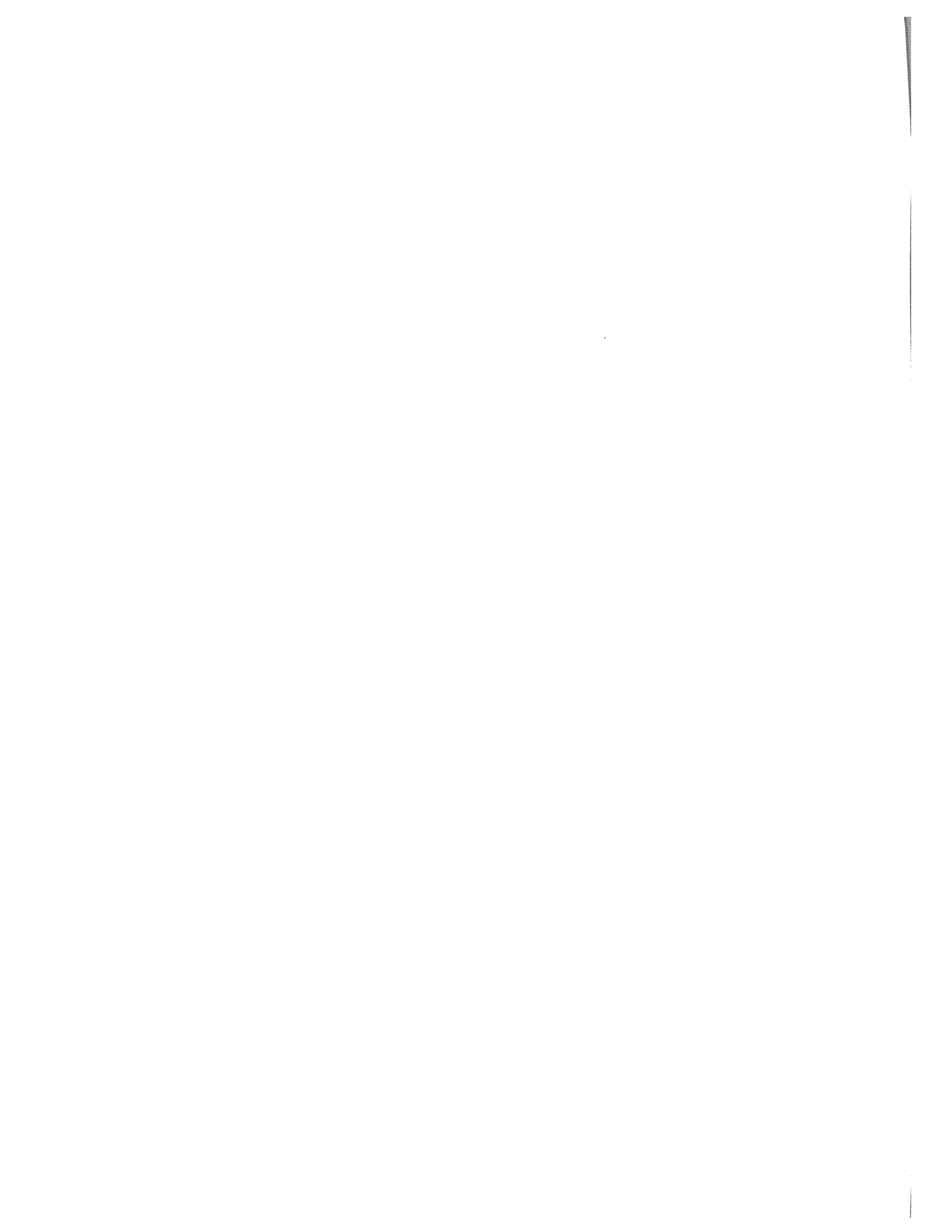


Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats

MSCS User Guide: This table indicates the NCCP habitats with which each evaluated wildlife and fish species is considered to be associated within the MSCS focus area. This table is used to identify potential Program impacts on species as a result of implementing Program actions within the range of a species that beneficially or adversely affect NCCP habitats with which they are associated. The species associated with each NCCP habitat are identified in the Summary of Beneficial and Adverse Program Effects and Conservation Measures tables presented in Attachment 5.

Evaluated Species	NCCP Habitat Type ¹																		
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	S U C	S F A	
Mammals																			
California wolverine <i>Gulo gulo luteus</i>							X					X					X		
Giant kangaroo rat <i>Dipodomys ingens</i>													X						
Greater western mastiff-bat <i>Eupomops perotis californicus</i>										X	X	X		X	X	X			
Merced kangaroo rat <i>Dipodomys heermanni dixonii</i>													X						
Nelson's antelope ground squirrel <i>Ammospermophilus nelsoni</i>													X						
Ringtail <i>Bassariscus astutus</i>										X	X			X	X	X			

Notes: Species are only considered to be associated with an NCCP habitat type if the species regularly occurs in the habitat type and the habitat is essential to maintaining the species' populations.

X = The species is associated with the NCCP habitat type.

¹TPA = Tidal perennial aquatic
 VRA = Valley riverine aquatic
 MRA = Montane riverine aquatic
 L = Lacustrine
 SE = Saline emergent

TFE = Tidal freshwater emergent
 NFPE = Nontidal freshwater permanent emergent
 NSW = Natural seasonal wetlands
 MSW = Managed seasonal wetlands
 VFR = Valley/foothill riparian

MR = Montane riparian
 G = Grassland
 IDS = Inland dune scrub
 US = Upland scrub
 VFW = Valley/foothill woodland

MWF = Montane woodland and forest
 UC = Upland cropland
 SFA = Seasonally flooded agriculture

Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹															
	T	V	M		S	T	N	M	V		I	V	M	S		
	P	R	R	L	E	F	S	S	F	M	D	F	W	U	F	
A	A	A			E	P	S	W	R	R	S	W	S	C	A	
Riparian brush rabbit <i>Sylvilagus bachmanii riparius</i>									X							
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>					X											
San Joaquin kit fox <i>Vulpes macrotis mutica</i>											X				X	
San Joaquin Valley woodrat <i>Neotoma fuscipes riparia</i>									X							
San Pablo California vole <i>Microtus californicus sanpabloensis</i>					X											
Suisun ornate shrew <i>Sorex ornatus sinuosus</i>					X	X										
Birds																
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	X			X	X	X	X		X						X	X
American peregrine falcon <i>Falco peregrinus anatum</i>	X			X	X	X	X	X	X							

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F P E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Bald eagle <i>Haliaeetus leucocephalus</i>	X	X	X	X					X	X	X					X		X
Bank swallow <i>Riparia riparia</i>		X								X								
Black-crowned night heron (rookery) <i>Nycticorax nycticorax</i>							X			X	X							
Black tern <i>Chlidonias niger</i>		X	X		X													
California black rail <i>Laterallus jamaicensis coturniculus</i>					X	X	X											
California brown pelican <i>Pelecanus occidentalis californicus</i>	X																	
California clapper rail <i>Rallus longirostris obsoletus</i>					X													
California condor <i>Gymnogyps californianus</i>												X		X	X			
California gull <i>Larus californicus</i>	X			X	X	X	X	X	X								X	X

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																
	T	V	M		S	T	N	M	V		I	V	M		S		
	P	R	R	L	E	F	S	S	F	M	D	F	W	U	F	C	A
California least tern <i>Sterna antillarum browni</i>	X																
California yellow warbler <i>Dendroica petechia brewsteri</i>									X	X							
Cooper's hawk <i>Accipiter cooperi</i>									X	X			X	X			
Double-crested cormorant (rookery) <i>Phalacrocorax auritus</i>									X	X							
Golden eagle <i>Aquila chrysaetos</i>									X		X	X	X				
Grasshopper sparrow <i>Ammodramus savannarum</i>						X		X									
Great blue heron (rookery) <i>Ardea herodias</i>									X	X							
Great egret (rookery) <i>Casmerodius albus</i>									X	X							
Greater sandhill crane <i>Grus canadensis tabida</i>							X	X	X		X					X	X

Notes: Species are only considered to be associated with an NCCP habitat type if the species regularly occurs in the habitat type and the habitat is essential to maintaining the species' populations.

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	S F A	
Least Bell's vireo <i>Vireo bellii pusillus</i>										X	X							
Little willow flycatcher <i>Empidonax traillii brewsteri</i>										X	X							
Long-billed curlew <i>Numenius americanus</i>	X				X	X	X	X	X			X					X	X
Long-eared owl <i>Asio otus</i>										X	X				X			
Mountain plover <i>Charadrius montanu</i>												X					X	
Northern harrier <i>Circus cyaneus</i>					X	X	X	X	X			X					X	X
Northern spotted owl <i>Strix occidentalis caurina</i>																X		
Osprey <i>Pandion haliaetus</i>	X	X	X	X						X	X				X	X		
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>					X													

Notes: Species are only considered to be associated with an NCCP habitat type if the species regularly occurs in the habitat type and the habitat is essential to maintaining the species' populations.

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																
	T	V	M			T	N	M	V			I	V	M	S		
	P	R	R	L	S	F	P	S	S	F	M	G	D	U	F	W	U
	A	A	A		E	E	W	W	R	R		S	S	W	F	C	A
San Pablo song sparrow <i>Melospiza melodia samuelis</i>					X												

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F P E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Short-eared owl <i>Asio flammeus</i>					X	X	X	X	X	X		X						X
Snowy egret (rookery) <i>Egretta thula</i>							X			X	X							
Suisun song sparrow <i>Melospiza melodia maxillaris</i>					X	X												
Swainson's hawk <i>Buteo swainsoni</i>								X	X	X		X		X	X		X	X
Tricolored blackbird <i>Agelaius tricolor</i>							X	X	X			X					X	X
Western burrowing owl <i>Athene cucularia hypugea</i>						X	X		X									
Western least bittern <i>Ixobrychus exilis</i>							X											
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	X								X									
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>										X								

Notes: Species are only considered to be associated with an NCCP habitat type if the species regularly occurs in the habitat type and the habitat is essential to maintaining the species' populations.

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F P E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
White-faced ibis <i>Plegadis chihi</i>						X	X		X								X	X
White-tailed kite <i>Elanus leucurus</i>					X	X	X	X	X	X		X					X	X
Yellow-breasted chat <i>Icteria virens</i>										X	X							
Reptiles																		
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>										X		X		X	X			
Blunt-nosed leopard lizard <i>Gambelia silus</i>												X						
Giant garter snake <i>Thamnophis gigas</i>						X	X	X	X	X								X
San Joaquin whipsnake <i>Masticophis flagellum ruddocki</i>												X	X	X				
Western pond turtle <i>Clemmys marmorata</i>		X	X	X			X		X	X								

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T	V	M			T	N	M	V			I	V	M		S		
	P	R	R	L	S	F	S	S	F	M	G	D	U	F	W	U	F	
	A	A	A		E	E	E	W	W	R	R	G	S	S	W	F	C	A
Amphibians																		
California red-legged frog <i>Rana aurora draytonii</i>		X	X	X			X	X	X	X	X	X						
California tiger salamander <i>Ambystoma californiense</i>								X	X			X						
Foothill yellow-legged frog <i>Rana boylei</i>		X	X							X	X							
Limestone salamander <i>Hydromantes brunus</i>													X	X				
Shasta salamander <i>Hydromantes shastae</i>														X	X			
Western spadefoot <i>Scaphiopus hammondi</i>								X										
Fishes																		
Central Coast steelhead Evolutionarily Significant Unit (ESU) <i>Oncorhynchus mykiss</i>	X	X	X		X	X												
Central Valley fall-run chinook salmon <i>Oncorhynchus tshawytscha</i> (fr)	X	X	X		X	X												

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Evaluated Species	NCCP Habitat Type ¹															
	T	V	M		S	T	N	M	V			I	V	M	S	
	P	R	R	L	E	F	S	S	F	M	G	D	U	F	W	U
A	A	A			E	P	W	W	R	R		S	S	W	F	C
Central Valley spring-run chinook salmon <i>Oncorhynchus tshawytscha</i> (sr)	X	X	X		X	X										
Central Valley steelhead ESU <i>Oncorhynchus mykiss</i>	X	X	X		X	X										
Delta smelt <i>Hypomesus transpacificus</i>	X				X	X										
Green sturgeon <i>Acipenser medirostris</i>	X	X				X										
Hardhead <i>Mylopharodon conocephalus</i>		X	X													
Longfin smelt <i>Spirinchus thaleichthys</i>	X				X	X										
McCloud River redband trout <i>Oncorhynchus mykiss</i> ssp. 2			X													
Rough sculpin <i>Cottus asperimui</i>			X													
Sacramento perch <i>Archoplites interruptus</i>	X	X		X	X	X	X									

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Table A: Wildlife and Fish Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹															
	T	V	M		S	T	N	M	V		I	V	M	S		
	P	R	R	L	E	F	S	S	F	M	D	F	W	U	F	
A	A	A			E	P	S	W	R	R	S	W	C	A		
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	X	X			X	X										
Tidewater goby <i>Eucyclogobius newberryi</i>	X				X	X										
Winter-run chinook salmon <i>Oncorhynchus tshawytscha</i> (wt)	X	X	X		X	X										
Invertebrates																
California freshwater shrimp <i>Syncaris pacifica</i>			X													
Callippe silverspot <i>Speyeria callippe callippe</i>											X					
Conservancy fairy shrimp <i>Branchinecta consarnatio</i>								X								
Delta green ground beetle <i>Elaphrus viridis</i>								X								
Lange's metalmark <i>Apodemis mormo langei</i>											X					
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>								X								

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	T	V	M		S	T	N	M	V			I	V	M		S	
	P	R	R	L	E	F	F	S	S	F	M	G	D	U	F	W	U
	A	A	A			E	W	W	R	R		S	S	W	F	C	A
Mid-valley fairy shrimp <i>Branchinecta n. sp.</i> "mid-valley"							X										
Monarch butterfly (roost) <i>Danaus plexippus</i>														X			
Shasta sideband <i>Monadenia troglodytes</i>															X		
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>									X	X							
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>							X										
Vernal pool tadpole shrimp <i>Lebidurus packardii</i>							X	X									

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Table B: Plant Evaluated Species Associated with NCCP Habitats

MSCS User Guide: This table indicates the NCCP habitats with which each evaluated plant species is considered to be associated within the MSCS focus area. This table is used to identify potential Program impacts on species as a result of implementing Program actions within the range of a species that beneficially or adversely affect NCCP habitats with which they are associated. The species associated with each NCCP habitat are identified in the Summary of Beneficial and Adverse Program Effects and Conservation Measures tables presented in Attachment 5.

Evaluated Species	NCCP Habitat Type ¹																	
	T	V	M			T	N	M	V			I	V	M		S		
	P	R	R	L	S	F	P	S	S	F	M	G	D	U	F	W	U	F
	A	A	A		E	E	E	W	W	R	R		S	S	W	F	C	A
Henderson's bent grass <i>Agrostis hendersonii</i>								X				X						
Sharsmith's onion <i>Allium sharsmithae</i>															X			
Rawhide Hill onion <i>Allium tuolumense</i>															X			
Sonoma alopecurus <i>Alopecurus aequalis</i> var. <i>sonomensis</i>							X	X										
Large-flowered fiddleneck <i>Amsinckia grandiflora</i>												X						

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Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Dimorphic snapdragon <i>Antirrhinum subcordatum</i>														X	X	X		
Mt. Diablo manzanita <i>Arctostaphylos auriculata</i>														X	X			
Baker's manzanita <i>Arctostaphylos bakeri</i> ssp. <i>bakeri</i>														X	X			
Klamath manzanita <i>Arctostaphylos klamathensis</i>														X		X		
Contra Costa manzanita <i>Arctostaphylos manzanita</i> ssp. <i>laevigata</i>														X				
Ione manzanita <i>Arctostaphylos myrtifolia</i>														X	X			
Pallid manzanita <i>Arctostaphylos pallida</i>														X	X	X		
Suisun Marsh aster <i>Aster lentus</i>						X												
Clara Hunt's milk-vetch <i>Astragalus clarianus</i>												X			X			
Big Bear Valley woollypod <i>Astragalus leucolobus</i>															X	X		

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	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R R	G	I D S	U S	V F W	M W F	U C	S F A
Jepson's milk-vetch <i>Astragalus rattanii</i> var. <i>jepsonianus</i>												X			X			
Ferris's milk-vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>							X	X				X						
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>								X										
Heartscale <i>Atriplex cordulata</i>								X				X						
Brittlescale <i>Atriplex depressa</i>								X				X						
San Joaquin spearscale <i>Atriplex joaquiniana</i>								X				X						
Vernal Pool smallscale <i>Atriplex persistens</i>								X										
Lesser saltscale <i>Atriplex minuscula</i>								X				X						
Lost Hills crownscale <i>Atriplex vallicola</i>								X				X						
Sonoma sunshine <i>Blennosperma bakeri</i>								X										

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Big tarplant <i>Blepharizonia plumosa</i> ssp. <i>plumosa</i>												X						
Indian Valley brodiaea <i>Brodiaea coronaria</i> ssp. <i>rosea</i>												X		X		X		
Chinese Camp brodiaea <i>Brodiaea pallida</i>												X						
Mt. Diablo fairy-lantern <i>Calochortus pulchellus</i>												X		X	X			
Tiburon Mariposa lily <i>Calochortus tiburonensis</i>												X						
Stebbins' morning-glory <i>Cahystegia stebbinsii</i>														X	X			
San Benito evening-primrose <i>Camissonia benitensis</i>														X	X			
Sharsmith's harebell <i>Campanula sharsmithiae</i>														X				
White sedge <i>Carex albida</i>							X											
Bristly sedge <i>Carex comosa</i>							X											

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Tree-anemone													X	X		
<i>Carpenteria californica</i>																
Tiburon Indian paintbrush																
<i>Castilleja affinis</i> ssp. <i>neglecta</i>																
Succulent owl's-clover																
<i>Castilleja campestris</i> ssp. <i>succulenta</i>																
Mason's ceanothus																
<i>Ceanothus masonii</i>																
Pine Hill ceanothus																
<i>Ceanothus roderickii</i>																
Hoover's spurge																
<i>Chamaesyce hooveri</i>																
Dwarf soaproot																
<i>Chlorogalum pomeridianum</i> var. <i>minus</i>																
Sonoma spineflower																
<i>Chorizanthe valida</i>																
Slough thistle																
<i>Cirsium crassicaule</i>																
Suisun thistle																
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>																

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Mariposa clarkia <i>Clarkia biloba</i> ssp. <i>australis</i>														X	X			
Shasta clarkia <i>Clarkia borealis</i> ssp. <i>arida</i>															X			
Beaked clarkia <i>Clarkia rostrata</i>												X			X			
Point Reyes bird's-beak <i>Cordylanthus maritimus</i> ssp. <i>palustris</i>					X													
Hispid bird's-beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>							X	X										
Soft bird's-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>					X													
Mt. Diablo bird's-beak <i>Cordylanthus nidularius</i>														X				
Palmate-bracted bird's-beak <i>Cordylanthus palmatus</i>								X										
Mt. Hamilton coreopsis <i>Coreopsis hamiltonii</i>														X	X			
Silky cryptantha <i>Cryptantha crinita</i>									X	X	X				X	X		

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	P	R	R	L	S	F	S	S	F	M	G	D	U	F	W	U		
	A	A	A		E	E	E	W	W	R	R	G	S	S	W	F	C	A
Baker's larkspur <i>Delphinium bakeri</i>														X				
Hospital Canyon larkspur <i>Delphinium californicum</i> ssp. <i>interius</i>															X			
Yellow larkspur <i>Delphinium luteum</i>												X	X					
Recurved larkspur <i>Delphinium recurvatum</i>								X				X			X			
Four-angled spikerush <i>Eleocharis quadrangulata</i>							X											
Brandegee's eriastrum <i>Eriastrum brandegeae</i>														X	X			
Hoover's eriastrum <i>Eriastrum hooveri</i>												X						
Ione buckwheat <i>Eriogonum apricum</i> var. <i>apricum</i>														X				
Irish Hill buckwheat <i>Eriogonum apricum</i> var. <i>prostratum</i>														X				
Ben Lomond buckwheat <i>Eriogonum nudum</i> var. <i>decurrens</i>														X	X			

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Evaluated Species	NCCP Habitat Type ¹																
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	P	R	R	L	E	F	S	S	F	M	D	F	W	U	W	U	F
A	A	A			E	E	W	W	R	R	G	S	S	W	F	C	A
Loch Lomond button-celery <i>Eryngium constancei</i>							X										
Delta coyote-thistle <i>Eryngium racemosum</i>						X			X								
Spiny-sepaled button-celery <i>Eryngium spinosepalum</i>							X				X						
Contra Costa wallflower <i>Erysimum capitatum</i> ssp. <i>angustatum</i>												X					
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>											X						
Pine Hill flannelbush <i>Fremontodendron decumbens</i>													X	X			
Adobe-lily <i>Fritillaria pluriflora</i>											X		X	X			
El Dorado bedstraw <i>Galium californicum</i> ssp. <i>sierrae</i>													X	X			
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>							X										
Diablo helianthella <i>Helianthella castanea</i>											X						

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Hall's tarplant <i>Hemizonia halliana</i>								X				X			X			
Congdon's tarplant <i>Hemizonia parryi</i> ssp. <i>congdonii</i>												X						
Brewer's western flax <i>Hesperolinon breweri</i>												X		X	X			
Marin western flax <i>Hesperolinon congestum</i>												X		X				
Drymaria-like western flax <i>Hesperolinon drymarioides</i>												X		X	X	X		
Napa western flax <i>Hesperolinon serpentinum</i>														X	X			
Tehama County western flax <i>Hesperolinon tehamense</i>														X	X			
Rose-mallow <i>Hibiscus lasiocarpus</i>						X	X											
Santa Cruz tarplant <i>Holocarpus macradenia</i>												X						
Parry's horkelia <i>Horkelia parryi</i>														X	X			

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Table B: Plant Evaluated Species Associated with NCCP Habitats (continued)

Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Carquinez goldenbush <i>Isocoma arguta</i>														X				
Northern California black walnut (native stands) <i>Juglans californica</i> var. <i>hindsii</i>										X								
Ahart's dwarf rush <i>Juncus leiospermus</i> var. <i>ahartii</i>								X										
Contra Costa goldfields <i>Lasthenia conjugens</i>								X										
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>					X	X												
Pale-yellow layia <i>Layia heterotricha</i>												X			X			
Legenere <i>Legenere limosa</i>								X										
San Joaquin woollythreads <i>Lembertia congdonii</i>								X				X						
Panoche peppergrass <i>Lepidium jaredii</i> ssp. <i>album</i>												X						
Heckard's peppergrass <i>Lepidium latipes</i> var. <i>beckardii</i>								X										

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	T	V	M			T	N	M	V		I	V	M		S		
	P	R	R	L	S	F	S	S	F	M	D	F	W	U	F		
	A	A	A		E	E	W	W	R	R	G	S	S	W	F	C	A
Saw-toothed lewisia <i>Lewisia serrata</i>									X			X		X			
Mason's lilaeopsis <i>Lilaeopsis masonii</i>						X											
Pitkin Marsh lily <i>Lilium pardalinum</i> ssp. <i>pitkinense</i>							X										
Bellinger's meadowfoam <i>Limnanthes floccosa</i> ssp. <i>bellingiana</i>							X						X				
Butte County meadowfoam <i>Limnanthes floccosa</i> ssp. <i>californica</i>								X									
Sebastopol meadowfoam <i>Limnanthes vinculans</i>								X									
Delta mudwort <i>Limosella subulata</i>						X											
Mt. Tedoc linanthus <i>Linanthus nuttallii</i> ssp. <i>howellii</i>													X	X			
Madera linanthus <i>Linanthus serrulatus</i>													X	X			
Congdon's lomatium <i>Lomatium congdonii</i>												X	X				

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Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Red-flowered lotus <i>Lotus rubriflorus</i>												X			X			
Shaggyhair lupine <i>Lupinus spectabilis</i>														X	X			
Showy madia <i>Madia radiata</i>												X			X			
Hall's bush mallow <i>Malacothamnus hallii</i>														X				
San Antonio Hills monardella <i>Monardella antonina ssp. antonina</i>														X	X			
Few-flowered navarretia <i>Navarretia leucocephala ssp. pauciflora</i>								X										
Many-flowered navarretia <i>Navarretia leucocephala ssp. plicantha</i>								X										
Pincushion navarretia <i>Navarretia myersii</i>								X										
Colusa grass <i>Neostapfia colusana</i>								X										
Shasta snow-wreath <i>Nemisia cliffonii</i>															X	X		

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Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Antioch Dunes evening-primrose <i>Oenothera deltooides</i> ssp. <i>howellii</i>													X					
San Joaquin Valley orcutt grass <i>Orcuttia inaequalis</i>								X										
Hairy orcutt grass <i>Orcuttia pilosa</i>								X										
Slender orcutt grass <i>Orcuttia tenuis</i>								X										
Sacramento orcutt grass <i>Orcuttia viscida</i>								X										
Ahart's paronychia <i>Paronychia ahartii</i>								X				X			X			
Thread-leaved beardtongue <i>Penstemon filiformis</i>															X	X		
White-rayed pentachaeta <i>Pentachaeta bellidiflora</i>												X						
Merced phacelia <i>Phacelia ciliata</i> var. <i>opaca</i>												X						
Mt. Diablo phacelia <i>Phacelia phacelioides</i>													X	X				

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Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F P E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Calistoga popcornflower <i>Plagiobothrys strictus</i>							X					X						
North Coast semaphore grass <i>Pleuropogon hooverianus</i>							X	X								X		
Napa blue grass <i>Poa napensis</i>							X											
Marin knotweed <i>Polygonum marinense</i>					X													
Eel-grass pondweed <i>Potamogeton zosteriformis</i>		X	X	X														
Hartweg's golden sunburst <i>Pseudobahia bahifolia</i>												X			X			
San Joaquin adobe sunburst <i>Pseudobahia peirsonii</i>												X			X			
California beaked-rush <i>Rhynchospora californica</i>							X									X		
Sanford's arrowhead <i>Sagittaria sanfordii</i>							X											
Rock sanicle <i>Sanicula saxatilis</i>												X		X	X	X		

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Evaluated Species	NCCP Habitat Type ¹																	
	T P A	V R A	M R A	L	S E	T F E	N F P E	N S W	M S W	V F R	M R	G	I D S	U S	V F W	M W F	U C	S F A
Marsh skullcap <i>Scutellaria galericulata</i>							X									X		
Mad-dog skullcap <i>Scutellaria lateriflora</i>							X	X										
Red Hills ragwort <i>Senecio clelandii</i> var. <i>heterophyllus</i>								X						X		X		
Layne's ragwort <i>Senecio layneae</i>														X	X			
Marin checkerbloom <i>Sidalcea hickmanii</i> ssp. <i>viridis</i>														X				
Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>hydrophila</i>							X			X								
Kenwood Marsh checkerbloom <i>Sidalcea oregana</i> ssp. <i>valida</i>							X											
English peak greenbriar <i>Smilax jamesii</i>							X								X	X		
Most beautiful jewel-flower <i>Streptanthus albidus</i> ssp. <i>peramoenus</i>												X		X				
Mt. Hamilton jewelflower <i>Streptanthus callistus</i>														X	X			

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Evaluated Species	NCCP Habitat Type ¹																
	T	V	M		S	T	N	M	V		I	V	M		S		
	P	R	R	L	E	F	S	S	F	M	D	F	W	U	F	C	A
Mt. Diablo jewelflower <i>Streptanthus hispidus</i>											X			X			
Arburua Ranch jewelflower <i>Streptanthus insignis</i> ssp. <i>lyonii</i>														X			
Tiburon jewelflower <i>Streptanthus niger</i>											X						
California seablite <i>Suaeda californica</i>					X												
Showy Indian clover <i>Trifolium amoenum</i>											X						
Greene's tuctoria <i>Tuctoria greenei</i>								X									
Crampton's tuctoria <i>Tuctoria mucronata</i>								X									
California vervain <i>Verbena californica</i>											X			X			

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Attachment 4

*Summary of Potential Beneficial and Adverse
Program Effects and Conservation Measures*



Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

NCCP Communities	Table Reference
Tidal perennial aquatic	A
Valley riverine aquatic	B
Montane riverine aquatic	C
Lacustrine	D
Saline emergent	E
Tidal freshwater emergent	F
Nontidal freshwater permanent emergent	G
Natural seasonal wetland	H
Managed seasonal wetland	I
Valley/foothill riparian	J
Montane riparian	K
Grassland	L
Inland dune scrub	M
Upland scrub	N
Valley/foothill woodland and forest	O
Montane woodland and forest	P
Upland cropland habitat	Q
Seasonally flooded agricultural habitat	R
Anadromous fish group	S
Estuarine fish group	T

Evaluated Species

Federally Listed as Endangered or Threatened

San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	L
Giant kangaroo rat	<i>Dipodomys ingens</i>	L
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	E
Least Bell's vireo	<i>Vireo bellii pusillus</i>	J K
Northern spotted owl	<i>Strix occidentalis caurina</i>	P
Northern spotted owl critical habitat	<i>Strix occidentalis caurina critical habitat</i>	P
California least tern	<i>Sterna antillarum browni</i>	A
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	A I
California clapper rail	<i>Rallus longirostris obsoletus</i>	E
American peregrine falcon	<i>Falco peregrinus anatum</i>	A D E F G H I
American peregrine falcon critical habitat	<i>Falco peregrinus anatum critical habitat</i>	A D E F G H I
Bald eagle	<i>Haliaeetus leucocephalus</i>	A B C D I J K P R
California condor	<i>Gymnogyps californianus</i>	L N O

(continued)

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table
Federally Listed as Endangered or Threatened (continued)		Reference
Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	A D E F G H I Q R
California brown pelican	<i>Pelecanus occidentalis californicus</i>	A
Alameda whipsnake	<i>Masticophis lateralis euryxanthus</i>	J L N O
Giant garter snake	<i>Thamnophis gigas</i>	F G H I J
Blunt-nosed leopard lizard	<i>Gambelia sila</i>	L
California red-legged frog	<i>Rana aurora draytonii</i>	B C D G H I J K L
Delta smelt	<i>Hypomesus transpacificus</i>	A E F
Delta smelt critical habitat	<i>Hypomesus transpacificus critical habitat</i>	A E F
Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	A B E F
Central Coast Steelhead ESU	<i>Oncorhynchus mykiss</i>	A B C E F
Central Valley Steelhead ESU	<i>Oncorhynchus mykiss (cv)</i>	A B C E F
Winter-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	A B C E F
Winter-run chinook salmon critical habitat	<i>Oncorhynchus tshawytscha critical habitat</i>	A B C E F
Tidewater goby	<i>Eucyclogobius newberryi</i>	A E F
Callippe silverspot	<i>Speyeria callippe callippe</i>	L
Lange's metalmark	<i>Apodemia mormo langei</i>	M
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	J K
Valley elderberry longhorn beetle critical habitat	<i>Desmocerus californicus dimorphus critical habitat</i>	J K
Delta green ground beetle	<i>Elaphrus viridis</i>	H
Delta green ground beetle critical habitat	<i>Elaphrus viridis critical habitat</i>	H
California freshwater shrimp	<i>Syncaris pacifica</i>	C
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	H
Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>	H
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	H
Vernal pool tadpole shrimp	<i>Lepidurus packardi</i>	H I
Antioch Dunes evening-primrose	<i>Oenothera deltoides ssp. howellii</i>	M
Antioch Dunes evening-primrose critical habitat	<i>Oenothera deltoides ssp. howellii critical habitat</i>	M
Butte County meadowfoam	<i>Limnanthes floccosa ssp. californica</i>	H
California seablite	<i>Suaeda californica</i>	E
California vervain	<i>Verbena californica</i>	L O
Calistoga popcornflower	<i>Plagiobothrys strictus</i>	G L
Chinese Camp brodiaea	<i>Brodiaea pallida</i>	L
Clara Hunt's milkvetch	<i>Astragalus clarianus</i>	L O
Colusa grass	<i>Neostapfia colusana</i>	H
(continued)		

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table Reference
Contra Costa goldfields	<i>Lasthenia conjugens</i>	H
Contra Costa wallflower	<i>Erysimum capitatum ssp. angustatum</i>	M
Contra Costa wallflower critical habitat	<i>Erysimum capitatum ssp. angustatum</i> <i>critical habitat</i>	M
Crampton's tuctoria	<i>Tuctoria mucronata</i>	H
El Dorado bedstraw	<i>Galium californicum ssp. sierrae</i>	N O
Few-flowered navarretia	<i>Navarretia leucocephala ssp. pauciflora</i>	H
Greene's tuctoria	<i>Tuctoria greenei</i>	H
Hairy orcutt grass	<i>Orcuttia pilosa</i>	H
Hartweg's golden sunburst	<i>Pseudobahia babtifolia</i>	L O
Hoover's eriastrum	<i>Eriastrum hooveri</i>	L
Hoover's spurge	<i>Chamaesyce hooveri</i>	H
Kenwood Marsh checkerbloom	<i>Sidalcea oregana ssp. valida</i>	G
Large-flowered fiddleneck	<i>Amsinckia grandiflora</i>	L
Large-flowered fiddleneck critical habitat	<i>Amsinckia grandiflora critical habitat</i>	L
Layne's ragwort	<i>Senecio layneae</i>	N O
Loch Lomond button-celery	<i>Eryngium constancei</i>	H
Many-flowered navarretia	<i>Navarretia leucocephala ssp. plieantha</i>	H
Marin western flax	<i>Hesperolinon congestum</i>	L N
Napa blue grass	<i>Poa napensis</i>	G
Pallid manzanita	<i>Arctostaphylos pallida</i>	N O P
Palmate-bracted bird's-beak	<i>Cordylanthus palmatus</i>	H
Pine Hill ceanothus	<i>Ceanothus roderickii</i>	N O
Pine Hill flannelbush	<i>Fremontodendron decumbens</i>	N O
Pitkin Marsh lily	<i>Lilium pardalinum ssp. pitkinense</i>	G
Sacramento orcutt grass	<i>Orcuttia viscida</i>	H
San Benito evening-primrose	<i>Camissonia benitensis</i>	N O
San Joaquin adobe sunburst	<i>Pseudobahia peirsonii</i>	L
San Joaquin Valley orcutt grass	<i>Orcuttia inaequalis</i>	H
San Joaquin woolythreads	<i>Lembertia congdonii</i>	H L
Sebastopol meadowfoam	<i>Limnanthes vinculans</i>	H
Showy Indian clover	<i>Trifolium amoenum</i>	L
Slender orcutt grass	<i>Orcuttia tenuis</i>	H
Soft bird's-beak	<i>Cordylanthus mollis ssp. mollis</i>	E
Sonoma alopecurus	<i>Alopecurus aequalis var. sonomensis</i>	G H
(continued)		

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table
Federally Listed as Endangered or Threatened (continued)		Reference
Sonoma spineflower	<i>Chorizanthe valida</i>	L
Sonoma sunshine	<i>Blennosperma bakeri</i>	H
Stebbins' morning-glory	<i>Calystegia stebbinsii</i>	N O
Succulent owl's-clover	<i>Castilleja campestris ssp. succulenta</i>	H
Suisun thistle	<i>Cirsium hydrophilum var. hydrophilum</i>	E
Tiburon Indian paintbrush	<i>Castilleja affinis ssp. neglecta</i>	L
Tiburon jewelflower	<i>Streptanthus niger</i>	L
Tiburon Mariposa lily	<i>Calochortus tiburonensis</i>	L
White sedge	<i>Carex albida</i>	G
White-rayed pentachaeta	<i>Pentachaeta bellidiflora</i>	L
California-listed as Endangered, Threatened, Rare, or Fully Protected		
Ringtail	<i>Bassariscus astutus</i>	J K N O P
Nelson's antelope ground squirrel	<i>Ammospermophilus nelsoni</i>	L
Riparian brush rabbit	<i>Sylvilagus bachmani riparius</i>	J
California wolverine	<i>Gulo gulo luteus</i>	G K P
Little willow flycatcher	<i>Empidonax traillii breusteri</i>	J K
Bank swallow	<i>Riparia riparia</i>	B J
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	J
Greater sandhill crane	<i>Grus canadensis tabida</i>	G H I L Q R
California black rail	<i>Laterallus jamaicensis coturniculus</i>	E F G
White-tailed kite	<i>Elanus leucurus</i>	E F G H I J L Q R
Golden eagle	<i>Aquila chrysaetos</i>	J L N O
Swainson's hawk	<i>Buteo swainsoni</i>	H I J L N O Q R
Shasta salamander	<i>Hydromantes sbastae</i>	O P
Limestone salamander	<i>Hydromantes brunus</i>	N O
Central Valley spring-run chinook salmon	<i>Oncorhynchus tshawytscha (sr)</i>	A B C E F
Rough sculpin	<i>Cottus asperimus</i>	C
Baker's larkspur	<i>Delphinium bakeri</i>	N
Baker's manzanita	<i>Arctostaphylos bakeri ssp. bakeri</i>	N O
Boggs Lake hedge-hyssop	<i>Gratiola heterosepala</i>	H
Delta coyote-thistle	<i>Eryngium racemosum</i>	G J
Indian Valley brodiaea	<i>Brodiaea coronaria ssp. rosea</i>	L N P
Ione buckwheat	<i>Eriogonum apricum var. apricum</i>	N
Irish Hill buckwheat	<i>Eriogonum apricum var. prostratum</i>	N
Marin checkerbloom	<i>Sidalcea hickmanii ssp. viridis</i>	N
(continued)		

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table
California-listed as Endangered, Threatened, Rare, or Fully Protected		Reference
Mason's ceanothus	<i>Ceanothus masonii</i>	N
Mason's lilaeopsis	<i>Lilaeopsis masonii</i>	F
Mt. Diablo bird's-beak	<i>Cordylanthus nidularius</i>	N
North Coast semaphore grass	<i>Pleuropogon hooverianus</i>	GHP
Rock sanicle	<i>Sanicula saxatilis</i>	LNOP
Santa Cruz tarplant	<i>Holocarpha macradenia</i>	L
Tree-anemone	<i>Carpenteria californica</i>	NOP
Yellow larkspur	<i>Delphinium luteum</i>	L
Federally Proposed		
San Joaquin Valley woodrat	<i>Neotoma fuscipes riparia</i>	J
Mountain plover	<i>Charadrius montanu</i>	LQ
Central Valley fall-run chinook salmon	<i>Oncorhynchus tshawytscha (fr)</i>	ABCEF
Ione manzanita	<i>Arctostaphylos myrtifolia</i>	NO
Federal Candidate		
California tiger salamander	<i>Ambystoma californiense</i>	HIL
McCloud river redband	<i>Oncorhynchus mykiss ssp 2</i>	C
California Species of Special Concern or CNPS List 1 or 2		
Greater western mastiff-bat	<i>Eumops perotis californicus</i>	JKLNOP
Suisun ornate shrew	<i>Sorex ornatus sinuosus</i>	EF
San Pablo California vole	<i>Microtus californicus sanpabloensis</i>	E
California yellow warbler	<i>Dendroica petechia brewsteri</i>	JK
Saltmarsh common yellowthroat	<i>Geothlypis trichas sinuosa</i>	E
San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	E
Suisun song sparrow	<i>Melospiza melodia maxillaris</i>	EF
Tricolored blackbird	<i>Agelaius tricolor</i>	GHILQR
Yellow-breasted chat	<i>Icteria virens</i>	JK
Long-eared owl	<i>Asio otus</i>	JKO
Short-eared owl	<i>Asio flammeus</i>	EFGHIJLR
Western burrowing owl	<i>Athene cunicularia hypugea</i>	FGI
California gull	<i>Larus californicus</i>	ADEFGHIQR
Black tern	<i>Chlidonias niger</i>	BCE
Long-billed curlew	<i>Numenius americanus</i>	A EFGHILQR
Cooper's hawk	<i>Accipiter cooperii</i>	JKOP
Northern harrier	<i>Circus cyaneus</i>	EFGHILQR
Osprey	<i>Pandion haliaetus</i>	ABCDJKOP

(continued)

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table Reference
White-faced ibis	<i>Plegadis chibi</i>	F G I Q R
Western least bittern	<i>Ixobrychus axilis</i>	G
Double-crested cormorant (rookery)	<i>Phalacrocorax auritus</i>	J K
San Joaquin whipsnake	<i>Masticophis flagellum ruddocki</i>	L M N
Western pond turtle	<i>Clemmys marmorata</i>	B C D G I J
Foothill yellow-legged frog	<i>Rana boylei</i>	B C J K
Western spadefoot	<i>Scaphiopus hammondi</i>	H
Hardhead	<i>Mylopharodon conocephalus</i>	B C
Sacramento perch	<i>Archoplites interruptus</i>	A B D E F G
Longfin smelt	<i>Spirinchus thaleichthys</i>	A E F
Green sturgeon	<i>Acipenser medirostris</i>	A B F
Monarch butterfly (roost)	<i>Danaus plexippus</i>	O
Adobe-lily	<i>Fritillaria pluriflora</i>	L N O
Ahart's dwarf rush	<i>Juncus leiospermus var. abartii</i>	H
Ahart's paronychia	<i>Paronychia abartii</i>	H L O
Alkali milkvetch	<i>Astragalus tener var. tener</i>	H
Arburua Ranch jewelflower	<i>Streptanthus insignis ssp. lyonii</i>	N
Beaked clarkia	<i>Clarkia rostrata</i>	L O
Bellinger's meadowfoam	<i>Limnanthes floccosa ssp. bellingeriana</i>	G O
Ben Lomond buckwheat	<i>Eriogonum nudum var. decurrens</i>	N O
Big Bear Valley woollypod	<i>Astragalus leucolobus</i>	O P
Big tarplant	<i>Blepharizonia plumosa ssp. plumosa</i>	L
Brewer's western flax	<i>Hesperolinon breweri</i>	L N O
Bristly sedge	<i>Carex comosa</i>	G
Brittlescale	<i>Atriplex depressa</i>	H L
California beaked-rush	<i>Rhynchospora californica</i>	G P
Carquinez goldenbush	<i>Isocoma arguta</i>	N
Congdon's lomatium	<i>Lomatium congdonii</i>	N O
Congdon's tarplant	<i>Hemizonia parryi ssp. congdonii</i>	L
Contra Costa manzanita	<i>Arctostaphylos manzanita ssp. laevigata</i>	N
Delta mudwort	<i>Limosella subulata</i>	F
Delta tule pea	<i>Lathyrus jepsonii var. jepsonii</i>	E F
Diablo helianthella	<i>Helianthella castanea</i>	L
Diamond-petaled California poppy	<i>Eschscholzia rhombipetala</i>	L
Dimorphic snapdragon	<i>Antirrhinum subcordatum</i>	N O P
(continued)		

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table
California Species of Special Concern or CNPS List 1 or 2 (continued)		Reference
Drymaria-like western flax	<i>Hesperolinon drymarioides</i>	L N O P
Dwarf soaproot	<i>Chlorogalum pomeridianum var. minus</i>	N
Eel-grass pondweed	<i>Potamogeton zosteriformis</i>	B C D
English Peak greenbriar	<i>Smilax jamesii</i>	G O P
Ferris' milkvetch	<i>Astragalus tener var. ferrisiae</i>	G H L
Four-angled spikerush	<i>Eleocharis quadrangulata</i>	G
Hall's bush mallow	<i>Malocothamnus hallii</i>	N
Hall's tarplant	<i>Hemizonia halliana</i>	H L O
Heartscale	<i>Atriplex cordulata</i>	H L
Heckard's peppergrass	<i>Lepidium latipes var. heckardii</i>	H
Hispid bird's-beak	<i>Cordylanthus mollis ssp. hispidus</i>	G H
Hospital Canyon larkspur	<i>Delphinium californicum ssp. interius</i>	O
Jepson's milkvetch	<i>Astragalus rattanii var. jepsonianus</i>	L O
Klamath manzanita	<i>Arcotostaphylos klamathensis</i>	N P
Legenere	<i>Legenere limosa</i>	H
Lesser saltscale	<i>Atriplex minuscula</i>	H L
Lost Hills crownscale	<i>Atriplex vallicola</i>	H L
Mad-dog skullcap	<i>Scutellaria lateriflora</i>	G H
Madera linanthus	<i>Linanthus serruatus</i>	O P
Mariposa clarkia	<i>Clarkia biloba ssp. australis</i>	N O
Marsh checkerbloom	<i>Sidalcea oregana ssp. hydrophila</i>	G J
Marsh skullcap	<i>Scutellaria galericulata</i>	G P
Merced phacelia	<i>Phacelia ciliata var. opaca</i>	L
Most beautiful jewelflower	<i>Streptanthus albidus ssp. peramoensus</i>	L N
Mt. Diablo fairy-lantern	<i>Calochortus pulchellus</i>	L N O
Mt. Diablo jewelflower	<i>Streptanthus hispidus</i>	L N
Mt. Diablo manzanita	<i>Arcotostaphylos auriculata</i>	N O
Mt. Diablo phacelia	<i>Phacelia phacelioides</i>	N O
Mt. Hamilton coreopsis	<i>Coreopsis hamiltonii</i>	N O
Mt. Hamilton jewelflower	<i>Streptanthus callistus</i>	N O
Mt. Tedoc linanthus	<i>Linanthus nuttallii ssp. howellii</i>	O P
Napa western flax	<i>Hesperolinon serpentinum</i>	N O
Northern California black walnut (native stands)	<i>Juglans californica var. hinsdii</i>	J
Pale-yellow layia	<i>Layia heterotricha</i>	L O
Panoche peppergrass	<i>Lepidium jaredii ssp. album</i>	L

(continued)

Index to Effects and Conservation Measures for NCCP Communities and Evaluated Species

Evaluated Species		Table
California Species of Special Concern or CNPS List 1 or 2 (continued)		Reference
Parry's horkelia	<i>Horkelia parryi</i>	N O
Pincushion navarretia	<i>Navarretia myersii</i>	H
Point Reyes bird's-beak	<i>Cordylanthus maritimus ssp. palustris</i>	E
Recurved larkspur	<i>Delphinium recurvatum</i>	H L O
Red Hills ragwort	<i>Senecio clelandii var. heterophyllus</i>	H N P
Red-flowered lotus	<i>Lotus rubriflorus</i>	L O
Rose-mallow	<i>Hibiscus lasiocarpus</i>	F G
San Joaquin spearscale	<i>Atriplex joaquiniana</i>	H L
Sanford's arrowhead	<i>Sagittaria sanfordii</i>	G
Saw-toothed lewisia	<i>Lewisia serrata</i>	K N P
Shaggyhair lupine	<i>Lupinus spectabilis</i>	N O
Sharsmith's harebell	<i>Campanula sharsmithiae</i>	N
Shasta clarkia	<i>Clarkia borealis ssp. arida</i>	O
Shasta snow-wreath	<i>Neviusia cliftonii</i>	O P
Showy madia	<i>Madia radiata</i>	L O
Silky cryptantha	<i>Cryptantha crinita</i>	J K L O P
Slough thistle	<i>Cirsium crassicaule</i>	G H J
Spiny-sepaled button-celery	<i>Eryngium spinosepalum</i>	H L
Suisun Marsh aster	<i>Aster lentus</i>	F
Tehama County western flax	<i>Hesperolinon tehamense</i>	N O
Thread-leaved beardtongue	<i>Penstemon filiformis</i>	O P
Vernal pool smallscale	<i>Atriplex persistens</i>	H
Other Species of Concern or CNPS List 3		
Merced kangaroo rat	<i>Dipodomys beermanni dixonii</i>	L
Black-crowned night heron (rookery)	<i>Nycticorax nycticorax</i>	G J K
Great blue heron (rookery)	<i>Ardea herodias</i>	J K
Great egret (rookery)	<i>Casmerodius albus</i>	J K
Snowy egret (rookery)	<i>Egretta thula</i>	G J K
Grasshopper sparrow	<i>Ammodramus savannarum</i>	L
Mid-valley fairy shrimp	<i>Brachinecta n. sp. "mid-valley"</i>	H
Shasta sideband	<i>Monadenia troglodytes</i>	P
Henderson's bent grass	<i>Agrostis hendersonii</i>	H L
Marin knotweed	<i>Polygonum marinense</i>	E
Rawhide Hill onion	<i>Allium tuolumnense</i>	O
San Antonio Hills monardella	<i>Monardella antonina ssp. antonina</i>	N O

Table A: Tidal Perennial Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: California least tern, western snowy plover, American peregrine falcon, American peregrine falcon critical habitat, bald eagle, Aleutian Canada goose, California brown pelican, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), delta smelt, delta smelt critical habitat, winter-run chinook salmon, winter-run chinook salmon critical habitat, tidewater goby, California freshwater shrimp, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run salmon, California gull, long-billed curlew, osprey, Sacramento perch, longfin smelt, and green sturgeon.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
More natural river flows and Bay-Delta freshwater inflow would improve tidal perennial aquatic habitat through increased organic carbon and other nutrients, improved flushing of contaminants and wastes, and higher seasonal water levels.	Potential for temporary increase in turbidity resulting from construction activities.	Design restorations and use construction methods that would minimize the release of sediment as a direct result of construction activities or subsequent erosion.
Alteration of Delta hydraulic condition and structural configurations could enhance habitat conditions for evaluated species.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	To the extent practicable, avoid, construction activities during periods evaluated species are present and could be affected by the actions.
Substantial increase in tidal perennial aquatic habitat area as a result of restoring up to 9,000 acres of shallow water tidal aquatic habitats and up to 190 miles of tidal sloughs.	Levee improvements could result in a loss or degradation of existing aquatic habitat.	To the extent consistent with Program objectives, design levee improvements to incorporate restoration of shallow aquatic tidal habitat.
Increase in tidal perennial aquatic habitat area as a result of restoring tidal exchange with leveed or diked lands.	Construction of conveyance facilities and associated infrastructure could result in loss or degradation of habitat.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of affected habitat near where impacts on habitat are incurred.

Table B: Valley Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: Bald eagle, California red-legged frog, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), winter-run chinook salmon, winter-run chinook salmon critical habitat, bank swallow, black tern, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, osprey, western pond turtle, foothill yellow-legged frog, hardhead, Sacramento perch, green sturgeon, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration riparian vegetation along up to 335 miles of channels and restoration and enhancement of up to 18,200 acres of floodplain riparian habitat would improve shaded riverine aquatic (SRA) habitat, instream and floodplain habitat, and stream temperature conditions for populations of native riverine aquatic species.	Temporary increase in turbidity resulting from implementing restoration actions.	To the extent practicable, avoid implementing transfers of water from sources that support flows that are beneficial to maintaining populations of native aquatic species.
Reducing diversions from tributaries could improve flow conditions for sustaining populations of native fish, increase survival of native aquatic species during life stages where species are susceptible to being entrained in diversions, and could reestablish floodplain processes associated with flow to more historic conditions.	Degradation of flow conditions for native aquatic species if water is transferred from uses that currently maintain existing flow conditions.	To the extent practicable, augment flows from other sources to maintain existing flow conditions.
Reduction in contaminant loadings in valley riverine aquatic habitats could improve the survivability of some species and increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Potential for loss or degradation of existing shaded riverine aquatic overhead cover along channels if construction activities results in removal of riparian vegetation adjacent to channels.	To the extent practicable, avoid disturbance to existing shaded riverine aquatic overhead cover.

Table B: Valley Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: Bald eagle, California red-legged frog, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), winter-run chinook salmon, winter-run chinook salmon critical habitat, bank swallow, black tern, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, osprey, western pond turtle, foothill yellow-legged frog, hardhead, Sacramento perch, green sturgeon, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration riparian vegetation along up to 335 miles of channels and restoration and enhancement of up to 18,200 acres of floodplain riparian habitat would improve shaded riverine aquatic (SRA) habitat, instream and floodplain habitat, and stream temperature conditions for populations of native riverine aquatic species.	Temporary increase in turbidity resulting from implementing restoration actions.	To the extent practicable, avoid implementing transfers of water from sources that support flows that are beneficial to maintaining populations of native aquatic species.
Reducing diversions from tributaries could improve flow conditions for sustaining populations of native fish, increase survival of native aquatic species during life stages where species are susceptible to being entrained in diversions, and could reestablish floodplain processes associated with flow to more historic conditions.	Degradation of flow conditions for native aquatic species if water is transferred from uses that currently maintain existing flow conditions.	To the extent practicable, augment flows from other sources to maintain existing flow conditions.
Reduction in contaminant loadings in valley riverine aquatic habitats could improve the survivability of some species and increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Potential for loss or degradation of existing shaded riverine aquatic overhead cover along channels if construction activities results in removal of riparian vegetation adjacent to channels.	To the extent practicable, avoid disturbance to existing shaded riverine aquatic overhead cover.

Table B: Valley Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Potential for increase in improvement in flow conditions for native aquatic species if water transfers result in augmenting stream flows.	Implementing actions could result in mortality of evaluated species.	Restore or enhance 1 to 3 times the linear footage of shaded riverine aquatic overhead cover for every linear foot of existing affected habitat near where impacts are incurred.
Improved streamflows in streams and rivers would improve flow conditions and stream temperatures for sustaining populations of native aquatic species, and could reestablish floodplain processes associated with flow to more historic conditions.	Permanent loss and fragmentation of riverine habitat, and disruption of fish movement patterns if storage facilities and associated infrastructure are constructed in drainages that support valley riverine aquatic habitat.	To the extent practicable, include project design features that allow for on-site re-establishment and long-term maintenance of shaded riverine aquatic overhead cover following project construction.
Improving sediment supplies in streams and rivers could improve spawning conditions for some species and would contribute to restoring floodplain processes.	Potential for permanent loss or degradation of valley riverine habitat downstream of storage reservoirs if storage operations reduces current patterns of flow.	To the extent practicable, avoid implementing actions during the periods evaluated species that are present in existing habitat areas could be effected by the actions.
Improved SRA habitat, instream habitat, and stream temperature conditions if increased sediment supplies increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.	Potential for recreational associated disturbance to evaluated species associated with valley riverine aquatic habitats in the vicinity of new or enlarged storage reservoirs.	To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.
Potential for increasing numbers of all life stages of anadromous fish as a result of increasing access to or restoring historic spawning habitats, reducing mortalities to straying, and increasing the number of juveniles successfully passing downstream of barriers.		To the extent consistent with achieving Program objectives, avoid constructing storage reservoirs on tributaries that support spawning populations of anadromous fish.
		Provide sufficient outflow from storage reservoirs sufficient to maintain existing aquatic habitat conditions downstream of new storage reservoirs.

Table B: Valley Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		To the extent consistent with achieving Program objectives, design storage facilities to allow passage of anadromous fish to and from spawning habitat located above reservoirs.
		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.
		To the extent consistent with achieving Program objectives, restrict recreational uses associated with storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive valley riverine aquatic habitat areas and associated species.

Table C: Montane Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: Bald eagle, black tern, California red-legged frog, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), winter-run chinook salmon, winter-run chinook salmon critical habitat, rough sculpin, McCloud River redband trout, California freshwater shrimp, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, osprey, western pond turtle, foothill yellow-legged frog, hardhead, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Reducing diversions from tributaries could improve flow conditions for sustaining populations of native fish, increase survival of native aquatic species during life stages where species are susceptible to being entrained in diversions, and could reestablish floodplain processes associated with flow to more historic conditions.	Degradation of flow conditions for native aquatic species where water is transferred from uses that currently maintain existing flow conditions.	Avoid, to the extent practicable, implementing transfers of water from sources that support flows that are beneficial to maintaining populations of native aquatic species.
Potential for increase in improvement in flow conditions for native aquatic species if water transfers result in augmenting stream flows.	Temporary increase in turbidity resulting from implementing actions necessary to increase sediment supplies.	To the extent practicable, augment flows from other sources to maintain existing flow conditions.
Improved shaded riverine aquatic habitat, instream habitat, and stream temperature conditions for populations of native aquatic species as a result of restoring habitat, improving sediment supply to channels, and improving flows in tributaries.	Implementing actions could result in mortality of evaluated species.	To the extent practicable, avoid implementing actions during the periods evaluated species that are present in existing habitat areas could be effected by the actions.

Table C: Montane Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Improved shaded riverine aquatic habitat, instream habitat, and stream temperature conditions where increased sediment supplies increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.</p>	<p>Permanent loss and fragmentation of riverine habitat and disruption of fish movement patterns if storage facilities and associated infrastructure are constructed in drainages that support montane riverine habitat.</p>	<p>To the extent consistent with achieving Program objectives, avoid constructing storage reservoirs on tributaries that support spawning populations of anadromous fish.</p>
<p>rs of all life stages of anadromous fish as a result of increasing access to or restoring historic spawning habitats, reducing mortalities to straying, and increasing the number of juveniles successfully passing downstream of barriers.</p>	<p>Potential for permanent loss or degradation of montane riverine habitat downstream of storage reservoirs if storage operations reduces current patterns of flow.</p>	<p>Provide sufficient outflow from storage reservoirs sufficient to maintain existing aquatic habitat conditions downstream of storage reservoirs.</p>
<p>Reduction in contaminant loadings in montane riverine aquatic habitats could improve the survivability of some species and increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.</p>	<p>Recreational associated disturbance to evaluated species associated with montane riverine aquatic habitats in the vicinity of new and enlarged storage reservoirs.</p>	<p>To the extent practicable, design storage facilities to allow passage of anadromous fish to and from spawning habitat located above reservoirs.</p>
		<p>To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from the inundation area of reservoirs islands to suitable nearby habitat areas.</p>
		<p>To the extent practicable, restrict recreational uses at new storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive montane riverine aquatic habitat areas and associated species.</p>

Table D: Lacustrine Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: American peregrine falcon, American peregrine falcon critical habitat, bald eagle, Aleutian Canada goose, California red-legged frog, California gull, osprey, western pond turtle, Sacramento perch, eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in lacustrine habitat area as a result of restoring permanent open water areas within restored nontidal marshes.	Loss of lacustrine habitat where lacustrine habitats are restored to tidal, wetland, riparian, or grassland habitat.	To the extent practicable, avoid disturbance to existing high value habitat areas.
Increase in habitat area where restoration and management of seasonal wetlands results in the establishment of interior patches of permanent open water habitat.	Construction-related activities or flooding associated with implementing actions could result in mortality of evaluated species.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be affected by the actions.
Increase in habitat area where enhancement of wildlife habitat values associated with agricultural lands results in the establishment of permanent open water habitats, such as brood ponds.	Potential for temporary loss or degradation of habitat area associated with implementation restoration actions.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely affected by toxic agents and that are prey for some evaluated species.	Loss of habitat area where actions result in dewatering farm ponds or other habitat areas dependent on agricultural operations.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.

Table D: Lacustrine Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Refurbishment and maintenance of levees would provide long-term protection of existing habitat areas from flooding that would result from levee failures.</p>	<p>Potential for loss or degradation of existing habitat areas if water is transferred from uses that currently maintain lacustrine habitat.</p>	<p>To the extent practicable, avoid implementing transfers of water from sources that support high value lacustrine habitats.</p>
<p>Increase in habitat area where conservation of water for agricultural uses results in the establishment of permanent ponds to capture agricultural tail water.</p>	<p>Construction of new conveyance facilities and supporting infrastructure could result in the loss or degradation of habitat areas.</p>	
<p>Potential for maintaining or increasing the availability of water for management of existing and restored habitat areas if water supplies are made available for such uses through water transfers.</p>		
<p>Increase in lacustrine habitat area associated with new conveyance facilities.</p>		
<p>Substantial increase in lacustrine habitat area resulting from construction of new or enlargement of existing storage reservoirs.</p>		
<p>Restoration of up to 1,600 acres of lacustrine habitat adjacent to existing and restored wetlands.</p>		
<p>Increase in habitat area where actions result in modifying existing channels to create overflow channels and backwaters that maintain permanent water.</p>		
<p>More natural flows could improve floodplain lacustrine habitat and communities by providing higher, more natural water levels and river flows that would inundate ponds, lakes, and oxbows in river floodplains.</p>		

Table E: Saline Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: Salt marsh harvest mouse, California clapper rail, American peregrine falcon, American peregrine falcon critical habitat, Aleutian Canada goose, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), delta smelt, delta smelt critical habitat, winter-run chinook salmon, winter-run chinook salmon critical habitat, tidewater goby, California seablite, soft bird's-beak, Suisun thistle, black tern, California black rail, white-tailed kite, Mason's lilaepsis, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, Suisun ornate shrew, saltmarsh common yellowthroat, San Pablo song sparrow, Suisun song sparrow, short-eared owl, California gull, long-billed curlew, northern harrier, Sacramento perch, longfin smelt, delta tule pea, Point Reyes birds-beak, San Pablo California vole, and Marin knotweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Long-term protection of existing tidal saline emergent wetland habitat in the extreme western Delta from the direct adverse effects of dredging and increases in suitable substrates necessary for the natural re-establishment of saline emergent vegetation in as a result of increased sediment deposition in channels.</p>	<p>Temporary or permanent loss or degradation of existing tidal saline emergent wetland habitat area along channels where construction activities result in removal of saline emergent vegetation or its supporting hydrology.</p>	<p>To the extent practicable, avoid disturbance to existing saline emergent wetland habitat areas.</p>
<p>Reduction in the use of herbicides and pesticides near existing tidal saline emergent wetland habitat areas in the extreme western Delta could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely affected by toxic agents and that are prey for some evaluation species.</p>	<p>Construction-related activities associated with implementing actions could result in mortality of evaluation species.</p>	<p>Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of affected existing saline emergent wetland habitat. This compensation should be implemented before the impact occurs and near the affected location.</p>

Table E: Saline Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Increase in habitat area where protection, enhancement, or restoration of shallow-water and tidal slough habitats create geomorphic and hydrologic conditions suitable for the establishment and maintenance of tidal emergent vegetation.</p>	<p>Permanent loss or degradation of existing nontidal saline emergent wetland habitat area where diked or leveed lands are flooded to restore tidal habitats.</p>	<p>To the extent practicable, include project design features that allow for on-site re-establishment and long-term maintenance of saline emergent wetland vegetation following project construction.</p>
<p>Restoration of 7,500 to 12,000 acres of tidal saline emergent wetland habitat area.</p>	<p>Potential for permanent loss or degradation of existing nontidal saline emergent wetland habitat area as a result of restoring nontidal open-water habitat.</p>	<p>To the extent practicable, avoid construction activities during the breeding period of evaluation species that are present in existing habitat areas and that could be affected by the actions.</p>
<p>Increase in habitat area where management of seasonal wetlands results in the establishment of interior patches of nontidal saline wetland habitats.</p>	<p>Short-term disturbance to existing nontidal saline wetlands as a result of improving management on existing seasonal wetlands.</p>	<p>To the extent practicable, avoid direct disturbance to populations and individuals of evaluation plant species.</p>
<p>Long-term protection of existing tidal habitat areas from boat wake induced erosion of shoreline and channel island habitat areas.</p>		<p>Establish and protect additional populations of evaluation plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.</p>
		<p>To the extent practicable, trap and relocate special-status wildlife species that would be unlikely to avoid construction equipment or escape inundation resulting from restoration to suitable nearby habitat areas.</p>
		<p>To the extent practicable, initially restore habitat areas in locations that do not support tidal emergent vegetation before restoring habitat in areas that support emergent vegetation to ensure there is no net loss of habitat area over the period restoration is implemented.</p>

Table E: Saline Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		To the extent practicable, avoid restoring nontidal saline emergent habitat areas with high habitat values to tidal wetlands or other habitat types.
		Minimize potential effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.

Table F: Tidal Freshwater Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species Potentially Affected by the Program: American peregrine falcon, American peregrine falcon critical habitat, Aleutian Canada goose, giant garter snake, Central Coast steelhead Evolutionarily Significant Unit (ESU), Central Valley steelhead Evolutionarily Significant Unit (ESU), delta smelt, delta smelt critical habitat, winter-run chinook salmon, winter-run chinook salmon critical habitat, tidewater goby, California black rail, white-tailed kite, Mason’s lilaopsis, Sacramento splittail, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, Suisun ornate shrew, Suisun song sparrow, short-eared owl, California gull, northern harrier, white-faced ibis, grasshopper sparrow, long-billed curlew, western burrowing owl, Sacramento perch, longfin smelt, green sturgeon, delta mudwort, delta tule pea, rose-mallow, and Suisun marsh aster.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in habitat area in some locations where timing and magnitude of augmented flows are sufficient to result in additional flooding at higher elevations than are currently inundated by tides.	Temporary or permanent loss or degradation of existing tidal freshwater emergent wetland habitat area along channels where construction activities result in removal of tidal freshwater emergent vegetation or its supporting hydrology.	To the extent practicable, avoid disturbance to existing tidal freshwater emergent wetland habitat areas.
Increase in tidal freshwater emergent wetland habitat area where modified channels include features (e.g., benches along setback levees) that would allow for the natural re-establishment of tidal freshwater emergent vegetation.	Construction-related activities associated with implementing actions could result in mortality of evaluation species.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing tidal freshwater emergent wetland habitat. This compensation should be implemented before the impact occurs and near the impact location.
Increase in habitat area where protection, enhancement, or restoration of shallow-water, channel island, tidal slough, and riparian habitats create geomorphic and hydrologic conditions suitable for the establishment and maintenance of tidal emergent vegetation.	Loss of evaluation plant species where tidal hydrology changes sufficiently to create conditions unsuitable for maintaining populations of evaluation plant species.	To the extent practicable, include project design features that allow for on-site re-establishment and long-term maintenance of tidal freshwater emergent wetland vegetation following project construction.

Table F: Tidal Freshwater Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration of 30,000 to 45,000 acres of tidal freshwater emergent wetland habitat area.	Permanent loss or degradation of tidal freshwater emergent wetland habitat along channels upstream of new screened intake at Clifton Court Forebay and operable barriers where operation of new structures adversely affects the hydrology supporting existing tidal freshwater emergent wetland habitat.	To the extent practicable, avoid construction activities during the breeding period of evaluation species that are present in existing habitat areas and that could be affected by the actions.
Long-term protection of existing tidal freshwater emergent wetland habitat from the direct adverse effects of dredging and potential increase in suitable substrates necessary for the natural re-establishment of emergent vegetation as a result of increased sediment deposition in channels.	Construction of storage and conveyance facilities and associated infrastructure could result in short-term or permanent loss or degradation of tidal freshwater emergent wetland habitat.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluation plant species.
Reduction in the use of herbicides and pesticides near existing tidal freshwater emergent wetland habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely affected by toxic agents and that are prey for some evaluation species.		Establish and protect additional populations of evaluation plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.
Long-term protection of existing habitat areas from boat wake induced erosion of shoreline and channel island habitat areas.		To the extent consistent with achieving Program objectives, operate barriers and other instream structures affecting tidal movement in a manner that will not adversely affect the hydrology supporting populations of evaluation plant species.
		To the extent practicable, Initially restore habitat areas in locations that do not support tidal emergent vegetation before restoring habitat in areas that support emergent vegetation to ensure that there is no net loss of habitat area over the period that restoration is implemented.

Table F: Tidal Freshwater Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		To the extent consistent with achieving Program objectives, select Delta islands that support little or no emergent vegetation along adjacent channels for use as storage facilities.

Table G: Nontidal Freshwater Permanent Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: American peregrine falcon, American peregrine falcon critical habitat, Aleutian Canada goose, giant garter snake, California black rail, California wolverine, white-tailed kite, short-eared owl, California gull, northern harrier, white-faced ibis, California red-legged frog, tricolored blackbird, long-billed curlew, western least bittern, greater sandhill crane, western burrowing owl, Sacramento perch, western pond turtle, black-crowned night heron (rookery), and snowy egret (rookery) , bristly sedge, hispid bird’s-beak, mad-dog skullcap, rose-mallow, Sanford’s arrowhead, slough thistle, Calistoga popcorn flower, Kenwood Marsh checkerbloom, Napa blue grass, Pitkin Marsh lily, Sonoma alopecurus, white sedge, North Coast semaphore grass, California beaked-rush, marsh skullcap, Ferris’ milkvetch, four-angled spikerush, marsh checkerbloom, Delta coyote-thistle, Bellinger’s meadowfoam, English peak greenbriar.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration of up to 17,000 acres of nontidal freshwater permanent emergent marsh habitat area in the Delta Region.	Potential for permanent loss or degradation of existing habitat area as a result of restoring existing nontidal permanent wetlands to other habitat types.	To the extent practicable, avoid disturbance to existing habitat areas.
Increase in habitat area where restoration and management of seasonal wetlands results in the establishment of interior patches of freshwater permanent wetland habitats.	Construction-related activities or flooding associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 1 to 3 acres of additional in-kind habitat for every acre of existing habitat affected by restoration near where impacts would occur before implementing actions that could result in the loss or degradation of habitat.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Potential for temporary loss or degradation of habitat area associated with restoration actions.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be effected by the actions.

Table G: Nontidal Freshwater Permanent Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.	Water conservation measures could result in localized loss of relatively small habitat areas where emergent vegetation is currently supported primarily by seeps or runoff associated with existing inefficiencies in the use agricultural water.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
Increase in the availability of water for management of existing and restored habitat areas where water supplies are made available for such uses through water transfers.	Loss or degradation of existing emergent wetlands habitat areas where water is transferred from uses that currently support wetland vegetation.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.
Increase in wetland habitat area where design and operation of storage reservoirs provide suitable substrate and hydrology to support the natural establishment and long-term maintenance of emergent vegetation along storage reservoir shorelines.	Construction of storage and conveyance facilities and associated infrastructure could result in temporary or permanent loss or degradation of nontidal permanent wetland habitat.	Minimize potential effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.
Increase in habitat area where increased flows inundate overflow channels, old oxbows, and other floodplain features for sufficient periods to allow for the establishment and maintenance of emergent vegetation.	Loss or degradation of habitat area on the landward side of levees where levees are setback to reestablish stream meander corridors and floodplain habitats.	To the extent practicable, avoid implementing transfers of water from sources that support emergent wetland vegetation.
Increase in habitat area where actions result in modifying existing channels to create overflow channels and backwaters that support emergent vegetation.	Permanent loss or degradation of emergent wetlands downstream of storage reservoirs where storage operations adversely affect current channel hydrology supporting existing wetland vegetation.	To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from storage reservoirs to suitable nearby habitat areas.
	Potential for recreational associated disturbance to evaluated species associated with nontidal freshwater permanent emergent habitat in the vicinity of new and enlarged storage reservoirs.	Provide sufficient outflow from storage reservoirs sufficient to support the long-term maintenance of wetland vegetation downstream of storage reservoirs.

Table G: Nontidal Freshwater Permanent Emergent Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		Restrict recreational uses at new storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas.

Table H: Natural Seasonal Wetland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: American peregrine falcon, American peregrine falcon critical habitat, giant grater snake, California red-legged frog, California tiger salamander, greater sandhill crane, white-tailed kite, tricolored blackbird, short-eared owl, Swainson’s hawk, California gull, long-billed curlew, northern harrier, western spadefoot, Delta green ground beetle, Delta green ground beetle critical habitat, Conservancy fairy shrimp, longhorn fairy shrimp, Mid-valley fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Sonoma alopecurus, North Coast semaphore grass, Ferris’ milkvetch, hispid bird’s-beak, mad-dog skullcap, slough thistle, Henderson’s bent grass, alkali milk-vetch, heartscale, brittlescale, lesser saltscale, San Joaquin spearscale, vernal pool, smallscale, Sonoma sunshine, Lost Hills crownscale, succulent owl’s clover, Hoover’s spurge, Palmate-bracted bird’s-beak, recurved larkspur, Loch Lomond button-celery, spiny-sepaled button-celery, Boggs Lake hedge-hyssop, Hall’s tarplant, Ahart’s dwarf rush, Contra Costa goldfields, legenera, San Joaquin woollythreads, Heckard’s peppergrass, Butte County meadowfoam, Sebastopol meadowfoam, few-flowered navarretia, many-flowered navarretia, pincushion navarretia, Colusa grass, San Joaquin Valley orcutt grass, Hairy orcutt grass, slender orcutt grass, Sacramento orcutt grass, Ahart’s paronychia, Red Hills ragwort, Greene’s tuctoria, Crampton’s tuctoria.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in natural seasonal wetland habitat where suitable hydrology develops along margins of restored nontidal permanent freshwater emergent habitat.	Temporary or permanent loss or degradation of existing natural seasonal wetland habitat where construction activities result in removal of seasonal wetland vegetation.	To the extent practicable, avoid disturbance to existing natural seasonal wetland habitat areas.
Potential for increases in natural seasonal wetland habitat area incidental to restoration and enhancement of managed seasonal wetlands.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing natural seasonal wetland habitat. This compensation should be implemented before the impact occurs and near the impact location.

Table H: Natural Seasonal Wetland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration of up to an estimated 200 acres of vernal pool habitat area and long-term protection of existing vernal pool habitats from potential loss or degradation from future changes in land use.	Loss or degradation of existing natural seasonal wetlands as a result of implementing aquatic, floodplain, wetland, riparian, and upland habitat enhancements and restorations.	To the extent consistent with achieving Program objectives, include project design features that allow for on-site re-establishment and long-term maintenance of natural seasonal wetland vegetation following project construction.
Long-term protection and enhancement of existing natural seasonal wetland habitat where grassland restoration and agricultural land enhancement activities also improve the quality of the associated seasonal wetlands.	Localized loss of relatively small seasonal wetland habitat areas where water conservation measures dewater habitat areas supported primarily by seeps or runoff associated with existing inefficiencies in the use of agricultural water.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing natural seasonal wetland habitat areas that could be affected by the actions.
Reduction in the use of herbicides and pesticides in or near existing seasonal wetland habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely affected by toxic agents and that are prey for some evaluated species.	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of natural seasonal wetlands.	To the extent consistent with achieving Program objectives, avoid direct disturbance to populations and individuals of evaluated plant species.
Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.	Potential for recreation associated disturbance to evaluated species associated with natural seasonal wetland habitats in the vicinity of new and enlarged storage reservoirs.	Establish and protect additional populations of evaluated plant species in suitable nearby natural seasonal wetland habitat areas before implementing construction activities that could affect existing populations or individuals.
Increase in habitat area where increased flows inundate overflow channels, old oxbows, and other floodplain features for sufficient periods to allow for the establishment and maintenance of seasonal wetland vegetation.		Minimize potential effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.
Depending on storage design and operation, potential for the natural establishment and long-term maintenance of seasonal wetland vegetation along shorelines of storage pools.		Restrict recreational uses at new storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas.

Table H: Natural Seasonal Wetland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		To the extent practicable, trap and relocate evaluated special-status wildlife species that would be unlikely to escape from storage inundation areas to suitable nearby habitat areas.

Table I: Managed Seasonal Wetland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: Western snowy plover, American peregrine falcon, American peregrine falcon critical habitat, bald eagle, Aleutian Canada goose, giant garter snake, California red-legged frog, vernal pool tadpole shrimp, greater sandhill crane, white-tailed kite, Swainson’s hawk, California tiger salamander, tricolored blackbird, short-eared owl, California gull, long-billed curlew, northern harrier, white-faced ibis, grasshopper sparrow, western burrowing owl, and western pond turtle.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Substantial increases in availability and/or quantity of suitable natural wetlands and grassland foraging habitat for waterfowl and other species that also forage in managed seasonal wetlands.	Loss of seasonal wetlands managed for wildlife where managed seasonal wetlands are converted to habitat types of lesser value to associated species.	To the extent consistent with achieving Program objectives, avoid restoring habitat or constructing facilities on lands currently managed to provide high values for target species if restored habitat would be of lesser value to target species.
Increase in the quantity and potential for substantial increase in habitat values associated with existing managed seasonal wetlands as a result of improved management.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 1 to 3 acres of suitable natural or agricultural habitats for species affected by the loss of managed wetlands.
Substantial increase in forage availability and abundance as a result of enhancing wildlife habitat values associated with up to 378,000 acres of agricultural lands for species that also use managed seasonal wetlands.	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of managed seasonal wetlands.	To the extent practicable, avoid construction activities in habitat areas when evaluated species are present and could be affected by proposed actions.

Table I: Managed Seasonal Wetland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Reduction in the use of herbicides and pesticides in or near existing habitat areas could result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.</p>	<p>Loss of managed seasonal wetlands where existing habitat areas retired to reduce selenium loadings.</p>	<p>To the extent consistent with achieving Program objectives, design wetlands to include transition habitat to uplands and upland buffer habitat area that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland associated species.</p>
<p>Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.</p>		<p>To the extent consistent with achieving Program objectives, manage storage operations to create seasonal wetland habitat areas along shorelines and lands exposed during drawdown periods.</p>
<p>Increase the availability of water for management of existing and created managed seasonal wetlands habitat areas where water supplies are made available for such uses through water transfers.</p>		
<p>Increase in habitat values associated with existing managed seasonal wetlands as a result of improved management.</p>		
<p>Long-term protection of agricultural lands that provide forage for species that also use managed seasonal wetlands from potential loss or degradation associated with potential future changes in land use.</p>		

Table J: Valley/foothill Riparian Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: Least bell’s vireo, bald eagle, Alameda whipsnake, giant garter snake, California red-legged frog, valley elderberry longhorn beetle, valley elderberry longhorn beetle critical habitat, ringtail, riparian brush rabbit, little willow flycatcher, bank swallow, western yellow-billed cuckoo, white-tailed kite, golden eagle, Swainson’s hawk, San Joaquin Valley woodrat, greater western mastiff-bat, California yellow warbler, yellow-breasted chat, long-eared owl, short-eared owl, Cooper’s hawk, osprey, double-crested cormorant (rookery), western pond turtle, foothill yellow-legged frog, black-crowned night heron (rookery), great blue heron (rookery), great egret (rookery), and snowy egret (rookery), marsh checkerbloom, Northern California black walnut (native stands), slough thistle, silky cryptantha, Delta coyote-thistle.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in habitat area where timing and magnitude of flows are sufficient to result in overbank flooding and provide the hydrologic conditions necessary for the natural establishment of riparian vegetation.	Temporary or permanent loss or degradation of existing habitat area where construction and maintenance activities result in removal of riparian vegetation.	To the extent practicable, avoid disturbance to existing habitat areas.
Increase in habitat area where modified channels include features (e.g., benches along setback levees) that allow for the natural re-establishment of riparian vegetation.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of habitat.
Increases in habitat area where sufficient hydrology is present the upper elevational zones of restored tidal and nontidal wetland habitats.	Water conservation measures could result in localized loss of relatively small habitat areas where riparian vegetation is currently supported primarily by seeps or runoff associated with existing inefficiencies in the use agricultural water.	To the extent practicable, include project design features that allow for on-site re-establishment and long-term maintenance of riparian vegetation following project construction.

Table J: Valley/foothill Riparian Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Long-term protection of channel islands that currently support riparian vegetation from potential loss to erosion.	Loss or degradation of existing riparian habitat areas where water is transferred from uses that currently support riparian vegetation.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be affected by the actions.
Protection and enhancement of existing riparian habitats where enhancement of seasonal wetlands and agricultural lands also improve the management and quality of associated riparian habitats.	Permanent loss or degradation of riparian habitat along channels upstream of operable barriers if operation of barriers adversely effects the hydrology supporting existing riparian vegetation.	To the extent consistent with achieving Program objectives, avoid direct disturbance to populations and individuals of evaluated plant species.
Protection, restoration, and enhancement of up to 18,200 acres of riparian habitat and riparian habitat associated with up to 355 miles of channel.	Construction of conveyance facilities and associated infrastructure could result in short-term or permanent loss or degradation of riparian habitat.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Loss or degradation of riparian habitat where reduction of contaminant loadings requires disturbance to stream channels that support riparian vegetation.	To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.
Long-term protection of existing habitat areas from flooding that would result from levee failures as a result of levee improvements.	Permanent loss and fragmentation of riparian corridors and disruption of wildlife movement patterns if storage facilities and associated infrastructure are constructed in drainages that support valley/foothill riparian habitat.	To the extent practicable, avoid implementing transfers of water from sources that support riparian vegetation.
Potential for increase in riparian habitat area if water transfers result in augmenting stream flows to alter hydrology of streams sufficiently to allow the natural establishment of riparian vegetation.	Potential for permanent loss or degradation of riparian habitat downstream of storage reservoirs if storage operations adversely effects current channel hydrology supporting existing riparian vegetation.	To the extent consistent with achieving Program objectives, operate barriers in a manner that will not adversely effect the hydrology supporting riparian vegetation upstream of barriers.

Table J: Valley/foothill Riparian Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Long-term increase in riparian habitat area where conveyance channel capacity is increased by setting back channel levees.</p>	<p>Potential for recreational associated disturbance to evaluated species associated with valley/foothill riparian habitat in the vicinity of new and enlarged storage reservoirs.</p>	<p>To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from storage reservoir inundation areas to suitable nearby habitat areas.</p>
<p>Increase in riparian habitat area if design and operation of Delta storage reservoirs provide suitable substrate and hydrologic conditions to support the natural and long-term establishment of riparian vegetation along storage island levees and shorelines.</p>		<p>Provide sufficient outflow from storage reservoirs sufficient to support the long-term maintenance of riparian vegetation downstream of storage reservoirs.</p>
<p>Increased riparian habitat area where increased sediment transport increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.</p>		<p>Restrict recreational uses at new storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas.</p>

Table K: Montane Riparian Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: California wolverine, least Bell’s vireo, bald eagle, California red-legged frog, valley elderberry longhorn beetle, valley elderberry longhorn beetle critical habitat, ringtail, little willow flycatcher, greater western mastiff-bat, California yellow warbler, yellow-breasted chat, long-eared owl, Cooper’s hawk, osprey, double-crested cormorant (rookery), foothill yellow-legged frog, black-crowned night heron (rookery), great blue heron (rookery), great egret (rookery), snowy egret (rookery), double-crested cormorant, silky crypstantha, saw-toothed lewisia.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in riparian habitat area where water transfers result in augmenting stream flows to alter hydrology of streams sufficiently to allow the natural establishment of riparian vegetation.	Loss or degradation of existing riparian habitat areas where water is transferred from uses that currently support riparian vegetation.	To the extent practicable, avoid implementing transfers of water from sources that support riparian vegetation.
Increased riparian habitat area where increased sediment transport increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.	Temporary or permanent loss or degradation of existing habitat area along channels if construction activities results in removal of riparian vegetation.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing habitat near where impacts would occur before implementing actions that could result in the loss or degradation of habitat.
Protection, enhancement, and increase in riparian habitat area where actions to improve montane riverine aquatic habitats improve the processes that support riparian vegetation.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	To the extent practicable, avoid disturbance to existing habitat areas.
	Temporary or permanent loss or degradation of riparian habitat where reducing contaminant loadings requires disturbance to stream channels that support riparian vegetation.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be affected by the actions.

Table K: Montane Riparian Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
	Permanent loss and fragmentation of riparian corridors and disruption of wildlife movement patterns where storage facilities and associated infrastructure are constructed in drainages that support montane riparian habitat.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
	Permanent loss or degradation of riparian habitat downstream of storage reservoirs if storage operations adversely effects current channel hydrology supporting existing riparian vegetation.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities are implemented that could affect existing populations or individuals.
	Recreational associated disturbance to evaluated species associated with montane riparian habitats in the vicinity of new and enlarged reservoirs.	Provide outflow from storage reservoirs sufficient to support the long-term maintenance of downstream riparian vegetation.
		To the extent practicable, trap and relocate evaluated species that would be unlikely to escape from the inundation area of storage reservoirs to suitable nearby habitat areas.
		Restrict recreational uses at new storage reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas.

Table L: Grassland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities). This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: San Joaquin kit fox, giant kangaroo rat, Merced kangaroo rat, California condor, Alameda whipsnake, blunt-nosed leopard lizard, California red-legged frog, callippe silverspot, Nelson’s antelope ground squirrel, greater sandhill crane, white-tailed kite, golden eagle, Swainson’s hawk, mountain plover, California tiger salamander, greater western mastiff-bat, tricolored blackbird, short-eared owl, long-billed curlew, northern harrier, San Joaquin whipsnake, Calistoga popcornflower, Hartweg’s golden sunburst, large-flowered fiddleneck, large-flowered fiddleneck critical habitat, Marin western flax, San Joaquin adobe sunburst, San Joaquin woollythreads, showy Indian clover, Sonoma spineflower, beaked clarkia, silky cryptantha, Tiburon Indian paintbrush, Tiburon jewelflower, Tiburon Mariposa lily, most beautiful jewel-flower, Mt. Diablo jewel-flower, California vervain, Chinese camp brodiaea, Indian valley brodiaea, rock sanicle, Santa Cruz tarplant, yellow larkspur, recurved larkspur, Hoover’s eriastrum, big tarplant, Mt. Diablo fairy-lantern, brittlescale, Congdon’s tarplant, Brewer’s western flax, drymaria-like western flax, pale-yellow layia, diamond-petaled California poppy, adobe-lily, Diablo helianthella, Hall’s tarplant, Jepson’s milk-vetch, Ferris’ milkvetch, Clara Hunt’s milk-vetch, heartscale, lesser saltscale, Lost Hills crownscale, San Joaquin spearscale, Merced phacelia, white-rayed pentachaeta, Panoche peppergrass, red-flowered lotus, showy madia, Ahart’s paronychia, spiny-sepaled button-celery, and Henderson’s bent grass.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in habitat area where grassland habitat is allowed to establish along the upper elevation margins of restored wetlands.	Short-term loss or degradation of grassland habitat where if construction required for habitat restorations or enhancements disturbs existing habitat areas.	Restore or enhance 1 to 3 acres of grassland habitat for every acre of existing habitat occupied by evaluated species affected by actions within the current range of affected species and near where impacts would occur before implementing actions that could result in the loss or degradation of occupied habitats.
Enhancement of existing grassland habitats where enhancement of existing seasonal wetlands and agricultural lands also improve the management and quality of associated grasslands.	Permanent loss or degradation of existing grassland habitat area where aquatic, wetland, or riparian habitats are restored in existing habitat areas.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be effected by the actions.

Table L: Grassland Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Restoration of an estimated 8,000 to 10,000 acres of perennial grassland habitat area.	Loss of grassland habitat area where water transfers subsequently results in farming idled or new lands that currently support grassland vegetation.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
Enhancement of an estimated 4,900 to 5,400 acres of grassland habitat area.	Permanent loss of grassland habitat area where conveyance facilities and associated infrastructure are constructed in existing habitat areas.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented. Restrict recreational uses near sensitive plant populations and wildlife use areas.
Increased enhancement in narrow corridors of grassland habitat as a result of restoring flood refugia habitat on levees and where grassland habitat is allowed to establish on refurbished or setback levees.	Permanent loss of grassland habitat area where storage reservoirs and associated infrastructure are constructed or existing reservoirs are enlarged in existing habitat areas.	
Reduction in the use of herbicides and pesticides in or near existing grassland habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some species.	Temporary inundation of grassland habitat area during flood periods in historic overflow basins that are hydrologically reconnected with channels..	
Long-term protection of existing grassland habitat areas from flooding as a result of rehabilitating and maintaining Delta and Suisun Marsh levees.	Construction-related activities associated with implementing actions could result in mortality, harm, or harassment of evaluated species.	
Increase in grassland habitat area where water transfers result in removing lands from agricultural production that subsequently support grassland vegetation.		
Potential for increase in grassland habitat area associated with active floodplains where levees are setback or bank revetment is removed to allow channels to meander.		

Table M: Inland Dune Scrub Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: San Joaquin whipsnake, Lange’s metalmark, Antioch Dunes evening primrose, Antioch Dunes evening primrose critical habitat, Contra Costa wallflower, and Contra Costa wallflower critical habitat.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in and enhancement of inland dune scrub habitat associated with the Antioch Dunes Ecological Reserve as a result of habitat restoration and enhancement.	Restoration and enhancement of habitat within and adjacent to the Antioch Dunes Ecological Reserve could result in the short-term loss or degradation of suitable habitat if construction required for habitat restoration disturbs existing habitat areas.	To the extent practicable, avoid disturbance to existing habitat areas.
Long-term protection of existing habitat areas resulting from improving land use practices adjacent to the Antioch Dunes Ecological Reserve.	Construction-related activities associated with implementing habitat restoration and enhancement actions could result in mortality of evaluated species present at the Antioch Dunes Ecological Reserve.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species and to naked buckwheat, the host plant of the Lange’s metalmark.
Potential increase in populations of evaluated species associated with the Antioch Dunes Ecological Reserve as a result of enhancing and restoring habitat area.		

Table N: Upland Scrub Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: California condor, Alameda whipsnake, limestone salamander, ringtail, golden eagle, Swainson’s hawk, greater western mastiff-bat, San Joaquin whipsnake, dimorphic snapdragon, El Dorado bedstraw, Marin western flax, pallid manzanita, Pine Hill ceanothus, Pine Hill flannelbush, adobe-lily, San Benito evening-primrose, tree-anemone, Stebbins’ morning-glory, Mt. Diablo fairy-lantern, Baker’s larkspur, Baker’s manzanita, Klamath manzanita, Indian Valley brodiaea, Ione buckwheat, Irish Hill buckwheat, Marin checkerbloom, Layne’s ragwort, Mason’s ceanothus, dwarf soaproot, Mt. Diablo bird’s beak, Mt. Hamilton coreopsis, rock sanicle, Red Hills ragwort, yellow larkspur, Brandegees’ eriastrium, Ione manzanita, Ben Lomond buckwheat, Congdon’s lomatium, Contra Costa manzanita, Mariposa clarkia, Mt. Diablo jewelflower, most beautiful jewel-flower, Arburua Ranch jewel-flower, Mt. Diablo manzanita, Mt. Hamilton jewelflower, Napa western flax, Brewer’s western flax, drymaria-like western flax, Tehama County western flax, Parry’s horkelia, Carquinez goldenbush, saw-toothed lewisia, shaggyhair lupine, Sharsmith’s harebell, Hall’s bush mallow, Mt. Diablo phacelia, and San Antonio Hills monardella.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat area.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be effected by the actions.
	Construction-related activities associated with implementing actions could result in mortality, of evaluated species.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
	Potential for permanent loss or degradation of existing habitat areas occupied by evaluated species.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.

Table N: Upland Scrub Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
	Potential for recreational associated disturbance to evaluated species associated with upland scrub habitats in the vicinity of new or enlarged storage reservoirs.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing habitat occupied by evaluated species affected by the actions within the current range of affected species and near where impacts would occur before implementing actions that could result in the loss or degradation of habitat. Restrict recreational uses associated with new or enlarged reservoirs as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas.

Table O: Valley/Foothill Woodland and Forest Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: California condor, Alameda whipsnake, limestone salamander, Shasta salamander, ringtail, golden eagle, Swainson’s hawk, greater western mastiff-bat, long-eared owl, Cooper’s hawk, osprey, monarch butterfly (roost), Sharnsmith onion, dimorphic snapdragon, Mt. Diablo manzanita, Baker’s manzanita, Clara Hunt’s milkvetch, Big Bear Valley woollypod, Jepson’s milk-vetch, tree-anemone, El Dorado bedstraw, Hartweg’s golden sunburst, rock sanicle, English peak greenbriar, Layne’s ragwort, pallid manzanita, Pine Hill ceanothus, Pine Hill flannelbush, adobe-lily, Hall’s tarplant, Brewer’s western flax, drymaria-like western flax, Naps western flax, Tehama County western flax, pale-yellow layia, Bellinger’s meadowfoam, Mt. Tedoc linanthus, Madera linanthus, San Benito evening-primrose, San Joaquin adobe sunburst, Mt. Diablo phacelia, Stebbin’s morning-glory, Mt. Diablo fairy-lantern, California vervain, Ione manzanita, Rawhide Hill onion, Ben Lomond buckwheat, Congdon’s lomatium, Hospital Canyon larkspur, recurved larkspur, Brandegee’s eriastrum, Mariposa clarkia, Shasta clarkia, beaked clarkia, Mt. Hamilton coreopsis, silky cryptantha, Mt. Hamilton jewelflower, red-flowered lotus, Parry’s horkelia, shaggyhair lupine, showy madia, Shasta snow-wreath, Ahart’s paronychia, thread-leaved beardtongue, and San Antonio Hills monardella.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Protection of up to 500 acres of existing woodlands adjacent to existing protected lands.	Construction of conveyance channels could result in the loss of individual trees within woodlands.	To the extent practicable, avoid disturbance to existing habitat areas.
Increase in habitat area where restoration of stream meander corridors and associated floodplain processes create conditions suitable for the natural re-establishment of valley oak woodland or savanna habitat.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing habitat adversely affected by the actions near where impacts would be incurred.
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat area.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be effected by the actions.

Table O: Valley/Foothill Woodland and Forest Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
	Potential for recreational associated disturbance to evaluated species associated with valley/foothill woodland and forest habitats in the vicinity of new or enlarged storage reservoirs.	<p>To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.</p> <p>Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities that could affect existing populations or individuals are implemented.</p> <p>Restrict recreational uses as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas in the vicinity of new or enlarged storage reservoirs.</p>

Table P: Montane Woodland and Forest Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: California wolverine, Shasta salamander, Shasta sideband, Northern spotted owl, Northern spotted owl critical habitat, bald eagle, ringtail, greater western mastiff-bat, Cooper’s hawk, osprey, Indian Valley brodiaea, North Coast semaphore grass, rock sanicle, dimorphic snapdragon, Klamath manzanita, Big Bear Valley woollypod, tree-anemone, silky cryptantha, drymaria-like western flax, Mt. Tedoc linanthus, Madera linanthus, Shasta snow-wreath, thread-leaved beardtongue, California beaked-rush, marsh skullcap, Red Hills ragwort, English peak greenbriar, pallid manzanita, and saw- toothed lewisia.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat area.	Restore or enhance 2 to 5 acres of additional in-kind habitat for every acre of existing habitat affected by the actions near where impacts would occur.
	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	To the extent practicable, avoid construction activities during the breeding period of evaluated species that are present in existing habitat areas that could be affected by the actions .
	Potential for recreational associated disturbance to evaluated species associated with valley/foothill woodland and forest habitats in the vicinity of new or enlarged storage reservoirs.	To the extent practicable, avoid direct disturbance to populations and individuals of evaluated plant species.
		Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before construction activities are implemented that could affect existing populations or individuals.

Table P: Montane Woodland and Forest Habitat : Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures
(continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		Restrict recreational uses as appropriate to reduce or avoid the likelihood for recreation related impacts on sensitive plant populations and wildlife use areas in the vicinity of new or enlarged reservoirs.

Table Q: Upland Cropland Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: San Joaquin kit fox, Aleutian Canada goose, greater sandhill crane, white-tailed kite, Swainson’s hawk, mountain plover, tricolored blackbird, California gull, long-billed curlew, northern harrier, and white-faced ibis.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Substantial increases in availability and/or quantity of suitable wetland and grassland forage habitat for waterfowl and other species that also forage in upland cropland habitat.	Loss of high value wildlife foraging habitat (e.g., cornfields and wheat fields) resulting from conversion of upland cropland habitats to seasonally flooded agriculture, aquatic, wetland, riparian, or grassland habitat.	To the extent practicable, restore aquatic, wetland, riparian, and grassland habitats on agricultural lands that have relatively low forage value (e.g., orchards and vineyards).
Substantial increase in forage availability and abundance for waterfowl, sandhill cranes, raptors, and other species as a result of enhancing wildlife habitat values associated with up to 378,000 acres of agricultural lands.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 1 to 3 acres of suitable natural foraging-habitat areas near affected lands for every acre of affected habitat regularly used by evaluated species and waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Loss of upland cropland habitat or forage where actions to reduce herbicide and pesticide loadings includes growing crops with lower forage value than crops currently being grown, idling of cropland, or reduction in forage biomass.	Increase suitable forage availability and/or quantity on 1 to 5 acres of agricultural lands near affected lands for every acre of affected habitat regularly used by evaluated species or waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.

Table Q: Upland Cropland Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.	Loss of upland cropland habitat or forage where actions to improve water use efficiency include growing crops with lower forage value than crops that are currently being grown, idling of cropland, or reduction in forage biomass.	To the extent practicable, avoid construction activities in habitat areas when evaluated species are present and could be affected by proposed actions.
Increase in upland cropland habitat or forage where actions to increase water use efficiency results in converting agricultural lands that require extensive seasonal flooding to row or grain crops, or eliminates fall or winter flooding of fields to control weeds.	Loss of upland cropland habitat where water is transferred from users which manage this habitat type.	To the extent consistent with achieving Program objectives, design wetlands to include transition habitat to uplands and upland buffer habitat area that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland associated species.
Protection of traditional sandhill crane wintering habitat area, including roosts, and foraging habitat area for other species that use upland cropland from potential future loss that could result from changes in land use.	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of upland cropland with high wildlife forage habitat value.	To the extent consistent with achieving Program objectives, manage restored and enhanced seasonal wetlands to maximize the availability or quantity of suitable forage for waterfowl and sandhill cranes.
Increase in forage quantity or availability for sandhill cranes and waterfowl where protected lands are managed to improve forage habitat conditions for sandhill cranes.	Potential loss of high value upland cropland foraging habitat area where these croplands are retired to reduce selenium loadings.	To the extent consistent with achieving Program objectives, design restored and enhanced wetlands and seasonally flooded agricultural habitats to include areas of habitat suitable for small mammals that would serve as refugia during periods when wetlands are flooded and provide source populations for reoccupation of wetland areas during periods that wetlands are dry.

Table Q: Upland Cropland Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
		To the extent consistent with achieving Program objectives, design and manage restored grasslands to maximize prey abundance and availability for raptors and provide habitat for other grassland associated species.
		To the extent consistent with achieving Program objectives, avoid seasonal flooding of upland croplands that are regularly used by sandhill cranes and other species that primarily forage in upland habitats.
		To the extent practicable, avoid construction and management activities in habitat areas when evaluated species are present and could be affected by proposed actions.
		To the extent practicable, avoid changing cropping practices on upland croplands that provide high forage values for wildlife.
		To the extent practicable, avoid constructing storage and conveyance facilities and associated infrastructure on upland cropland with high wildlife forage habitat value.

Table R: Seasonally Flooded Agriculture Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP habitat of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: Bald eagle, Aleutian Canada goose, giant garter snake, greater sandhill crane, white-tailed kite, Swainson’s hawk, tricolored blackbird, short-eared owl, California gull, long-billed curlew, northern harrier, and white-faced ibis.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Substantial increases in availability and/or quantity of suitable wetland and grassland forage habitat for waterfowl and other species that also forage in seasonally flooded agricultural habitat.	Potential for loss of high value wildlife foraging habitat (e.g., flooded cornfields and wheat fields) resulting from conversion of agricultural lands to upland cropland, aquatic, wetland, riparian, or grassland habitat.	To the extent practicable, restore aquatic, wetland, riparian, and grassland habitats on agricultural lands that have relatively low forage value (e.g., orchards and vineyards).
Substantial increase in forage availability and abundance for waterfowl, sandhill cranes, raptors, and other species as a result of enhancing wildlife habitat values associated with up to 378,000 acres of agricultural lands.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 1 to 3 acres of suitable natural foraging-habitat areas near affected lands for every acre of affected habitat regularly used by evaluated species and waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could result in an increase in invertebrate populations that are adversely effected by toxic agents and that are prey for some evaluated species.	Loss of seasonally flooded agricultural habitats or forage where actions to reduce herbicide and pesticide loadings include growing crops with lower forage value than crops currently being grown, idling of cropland, or reduction in forage biomass.	Increase suitable forage availability and/or quantity on 1 to 5 acres of agricultural lands near affected lands for every acre of affected habitat regularly used by evaluated species or waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.

Table R: Seasonally Flooded Agriculture Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures
(continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.	Loss of seasonally flooded agricultural habitat area and forage abundance or availability if water conservation actions result in reducing the amount or duration of water applied to agricultural lands.	Avoid converting seasonal agricultural wetlands that are used as roosts by wintering sandhill cranes to other habitat types.
Increase in seasonally flooded agricultural habitat area where water supplies are made available for such uses through water transfers.	Potential for loss of seasonally flooded agricultural habitat areas if water is transferred from this use.	To the extent practicable, avoid construction and management activities in habitat areas when evaluated species are present and could be affected by proposed actions.
Increase in forage habitat value for some species if storage facilities are located on Delta islands that support crops with little or no forage value and storage islands are operated in a manner that results in the creation of wetland habitats.	Construction of storage and conveyance facilities and associated infrastructure could result in the permanent loss of seasonally flooded agricultural lands with high wildlife forage habitat value.	To the extent consistent with achieving Program objectives, design wetlands to include transition habitat to uplands and upland buffer habitat area that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland associated species.
Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Protection of traditional sandhill crane wintering habitat area, including roosts, and foraging habitat area for other species that use seasonally flooded agricultural lands from potential future loss that could result from changes in land use.	Potential loss of high value seasonally flooded agricultural foraging habitat area where these croplands are retired to reduce selenium loadings.	To the extent consistent with achieving Program objectives, manage restored and enhanced seasonal wetlands to maximize the availability or quantity of suitable forage for waterfowl and sandhill cranes.

Table R: Seasonally Flooded Agriculture Habitat: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures
 (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increase in forage quantity or availability for sandhill cranes and waterfowl where protected lands are managed to improve forage habitat conditions for sandhill cranes.		<p>To the extent practicable, avoid implementing transfers of water from sources that support high value seasonally flooded agricultural habitat areas.</p> <p>To the extent practicable, avoid constructing storage and conveyance facilities and associated infrastructure on seasonally flooded agricultural lands with high wildlife forage habitat value.</p>

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts of implementing all Program actions on the fish group. Consequently, only a subset of the effects and conservation measures may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP community by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP fish group. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: Winter-run chinook salmon, Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead Evolutionarily Significant Unit (ESU), Central Coast steelhead ESU, and green sturgeon.

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
An increase in the freshwater inflow in fall, winter, and spring would increase the area of freshwater and low salinity migratory and juvenile rearing habitat in the Bay-Delta, and improve foodweb productivity. Increased inflows would also improve cues for immigrating adult salmon and sturgeon.	Reallocation of seasonal and multi-year water supplies to enhance spring and fall river flows and Delta inflow could limit available water supply in other seasons and future years particularly during critical years and extended droughts, which could adversely affect survival at those times in the opposite manner as stated for benefits. Steelhead are likely to be most adversely affected by flow reallocations that enhance spring and fall flows. High summer flows help to reduce water temperatures for rearing juvenile steelhead. Reduced summer flow could also increase susceptibility of emigrating juvenile green sturgeon to entrainment in diversions.	Consistent with Program objectives, implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outflow criteria deemed essential in maintaining anadromous fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of program actions. Measures may include additional dedicated surface or ground water stored specifically for this purpose, special options for the purchase of needed additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is initially to implement the actions to the extent feasible to determine potential effects on seasonal and critical year water supplies, and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years.

* Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>An increase in inflow in spring would increase the frequency of low salinity zone being located in more productive shallow bays of the Western Delta and North Bay rather than interior Delta channels, which could lead to higher food production and food availability for juvenile salmonids</p>	<p>Restricting cross-Delta transport of water in some channels, and focusing transport to other selected channels may increase transport of fish toward South Delta pumping plants in the selected channels, and reduce water quality in other channels to a point that may reduce survival.</p>	<p>Consistent with Program objectives, adjust hydraulics in various channels or construct and operate structures (e.g., the Head of Old River barrier) to ensure fish are not being drawn in greater numbers or proportions toward the pumps. Implement monitoring and testing necessary to design, construct, and operate barriers. Develop and implement procedures and operating criteria for barriers to protect fish. Implement monitoring necessary to detect movement of fish toward the south Delta pumping plants, and implement water management strategies that allow for reduced exports when anadromous fish are at risk. Develop water quality monitoring to detect adverse conditions for anadromous fish. Implement programs to improve water quality through source control, improved drainage management, improved treatment, and dilution.</p>
<p>Reduced cross-Delta flow increases the proportion of emigrating salmonid smolts from the Sacramento River basin that remain in the mainstem and experience higher survival rates (e.g., USFWS 1998).</p>	<p>Closure of the {Delta Cross Channel} (DCC) from November through January could increase export losses of fish from East Delta and San Joaquin River tributaries by increasing net upstream flows in the lower San Joaquin channel (i.e., negative QWEST flows) and diverting greater proportions of these tributaries inflows and their downstream migrating juvenile fish to the South Delta pumping plants.</p>	<p>To the extent consistent with Program objectives, constrain the closure of the DCC from November through January as necessary to minimize the extent of fish exposure to the south Delta pumping plants. Implement monitoring and testing necessary to {operate the DCC in ways that minimize losses of fish from the Sacramento River as well as from the East Delta tributaries and San Joaquin River.</p>

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>If increased spring inflow is sufficient to flood bypasses more frequently, juvenile salmonids could benefit from improved food supply in these habitats, resulting in increased growth rates and survival (Sommer et al. 1998).</p>	<p>Construction activities could result in mortality or harm of anadromous fish.</p>	<p>To the extent practicable, avoid construction activities during periods when anadromous fish species are present in high abundance or when life stages are present that are most susceptible to adverse effects associated with implementing actions.</p>
<p>Increased spring inflow would increase river silt load and flood more shoreline vegetation, which may reduce predation through greater turbidity and increase the available escape habitat.</p>	<p>Reactivation of flow to historic overflow basins and restoration of tidal wetlands may lead to stranding of anadromous fish if sufficient connectivity to main channels is not provided. . Flooding of these agricultural lands could increase loading of the Sacramento River with contaminants that adversely affect juvenile salmonids.</p>	<p>Implement proposed restoration actions in areas that 1) have the greatest potential to support high densities of anadromous fish and 2) that will link currently disjunct habitat patches. Avoid implementing development actions in habitat areas that currently support high densities of anadromous fish, or in locations that would reduce connectivity among habitat patches.</p>
<p>Increased spring inflow could reduce competition and predation from non-native species adversely affected by increased flows or seasonally lower Bay-Delta salinity levels (e.g., Asian clams).</p>	<p>{Non-native fish species may aggressively colonize enhanced and restored tidal and other aquatic habitats. Increased abundance of non-native species that compete with or prey upon anadromous fish may negate the habitat value of restored areas and could reduce survival and abundance of native anadromous fish.}</p>	<p>To the extent consistent with Program objectives, re-contour existing flood bypasses, and design and construct new flood bypasses from existing leveed lands in stages using construction design and operating schemes and procedures developed through pilot studies and project experience that minimize the potential for stranding as waters recede from bypasses. Increased spring inflow could reduce the loss of juvenile anadromous fish to water diversions by decreasing the proportion of water diverted, and by reducing negative flows in the lower San Joaquin River portion of the Delta. Removing levees and opening leveed lands to tidal action could have transient negative effects due to changes in hydraulics and reduced water quality.</p>

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Increased spring inflow may reduce the concentrations of contaminants..	Filling Delta channels to create channel islands could result in the loss of small amounts of shallow-water habitat.	To the extent consistent with Program objectives, confine additional winter pumping for flooding agricultural lands to times and areas of channels with low densities of anadromous fish.
Restoration of up to 66,000 acres of tidal habitats and up to 190 miles of tidal sloughs in the Bay-Delta would increase the area of rearing habitat, and could improve foodweb productivity.	Develop techniques that minimize potential effects on hydraulics and water quality from restoring subsided leveed lands to tidal wetlands.	To the extent consistent with Program objectives, confine additional winter diversions necessary to manage restored seasonal wetlands to non-dry years when water supplies are sufficient to minimize any effects on downstream transport, export pumping ratios, and foodweb productivity.
Closure of the DCC particularly in the November through January period would increase net freshwater inflow into the Western Delta from the Sacramento River, which could improve transport of Sacramento River fish to the shallow bays of the Western Delta and Suisun Bay, improve habitat in those areas, and reduce entrainment at south Delta pumping plants. Temporary and localized increases in turbidity could result from construction required to implement habitat restoration or other Program actions.	To the extent practicable, construct channel islands in locations that will minimize disruption and degradation of existing shallow-water and SRA habitats, and that will result in a net gain in areal extent and connectivity of these habitats .	To the extent consistent with Program objectives, place consolidated intakes in areas with minimal numbers of juvenile anadromous fish.

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Closure of the DCC during the winter could reduce straying of immigrating adult Sacramento River salmonids into the central Delta. Increasing the proportion of fish that migrate via the lower Sacramento River could reduce migration time and improve chances of successful spawning in the Sacramento River and its tributaries.</p> <p>An increase in agricultural water diversions in the Delta during winter to create managed seasonal wetlands could lead to an increase in entrainment losses of juvenile salmonids. In dry years net downstream transport of juvenile anadromous fish through the Delta could be reduced.</p>	<p>Consolidated larger and fewer diversions and positive-barrier bypass-screen systems could increase predation losses of anadromous fishes migrating through the Delta.</p>	<p>To the extent consistent with Program objectives, design and construct a new fish-screen system at the entrance to Clifton Court Forebay to alleviate the loss of juvenile anadromous fish to predation in the forebay and to the existing ineffective fish-bypass and collection facility within the forebay</p>
<p>Operation of the barrier at the head of Old River from in the fall could benefit adult immigration of East Delta and San Joaquin tributary salmon and steelhead to their spawning rivers and improve water quality in the eastern Delta including the San Joaquin River channel near Stockton, which may improve fish escapement to spawning grounds.</p>	<p>To the extent practicable, install screens on agricultural diversion intakes to avoid entrainment of anadromous fish.</p>	<p>To the extent consistent with Program objectives, screen intakes or connect intakes of the Tracy Pumping Plant (Central Valley Project) to the screened Clifton Court Forebay to alleviate loss of fish at the Tracy Fish Protection Facility.</p>
<p>Improving and restoring Yolo Bypass channels and drainage could reduce stranding losses of juvenile anadromous fish in the Bypass, provide added rearing habitat, and improve foodweb productivity in the Bypass and Delta.</p> <p>Upgrading levees could degrade existing riparian, wetland, and SRA habitats along existing levees. Additional adverse impacts listed above would also be associated with levee upgrades.</p>	<p>Reducing the total loadings of organic material in the aquatic environment could reduce foodweb productivity.</p>	<p>To the extent consistent with Program objectives, screen all Delta diversions that may entrain juvenile anadromous fish.</p>

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Expanded and restored slough habitat would increase the area of aquatic habitat, including shallow-water and SRA habitats, which would provide additional rearing habitat for juvenile salmonids and increase foodweb productivity.	Further development of water transfers could lead to (1) a shift in water diversions from the Delta to periods with higher risk of losses to entrainment, or (2) changes in timing and location of diversions that could adversely affect migrating and rearing habitat in the Delta or elsewhere.	Restore or enhance 1 to 3 times the amount of habitat affected by levee upgrades near where impacts are incurred.
Protection, enhancement, and restoration of riparian habitat along channels and channel islands would increase SRA habitat and shallow-water habitat, which could improve water temperatures, provide more migrating and rearing habitat, as well as improve foodweb productivity.	Alteration of south Delta channels could increase chances of some anadromous fish being drawn to and lost or damaged to south Delta pumping plants.	To the extent consistent with Program objectives, include project design features that allow for on-site re-establishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction.
{This sounds more like a conservation measure} Avoiding dredging at times and places in the Delta when juvenile anadromous fish are present and feeding in abundance, would help improve fish feeding habitats and potentially lead to improving juvenile survival and adult populations.	Alteration of conveyance features at south Delta pumping plants could increase the pumping capacity, which could lead to increasing entrainment and salvage losses at the intake facilities or possibly have adverse effects on migration and rearing habitat.	Reductions in unnatural inputs of organic carbon could be replaced with increased natural organic inputs such as from restored tidal wetlands and riparian habitats.
Reducing the abundance of non-native aquatic species and may reduce competition and predation.	The discharge of Sacramento River water into the interior Delta via Snodgrass Slough could result in some adult anadromous fishes bound for the Sacramento River and its tributaries being drawn into the Central Delta and up to the discharge point during annual spawning migrations up the Sacramento River.	To the extent practicable, water transfers should be conducted so as not to increase exports during times of the year when anadromous fish are more vulnerable to damage or loss at project facilities or when habitat may be adversely affected.

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Consolidating diversions and upgrading fish screens and handling systems could reduce entrainment losses.	Diversion of Sacramento River water into Snodgrass Slough via a screened intake on the Sacramento River could lead to predation and impingement losses of young anadromous fish at the intake.	To the extent practicable, construction and operation of new or improved conveyance features the north and south Delta should be designed to minimize losses of anadromous fishes and to improve migrating, rearing, and feeding habitats.
{Reduction in illegal net fishing and further limitations on the legal fisheries could reduce losses of juvenile and adult anadromous fish.}	Diversion of Sacramento River water into Snodgrass Slough without screening could result in greater numbers of anadromous fish from the Sacramento River being drawn into the interior Delta where they may have poorer habitat, be delayed in migration to the ocean, or have a greater chance of being drawn to south Delta pumping plants.	To the extent consistent with Program objectives, design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating anadromous fish, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for anadromous fish.
Reduction in the levels of contaminants being released into Delta channels could increase foodweb productivity and improve survival.	The increase in flushing rate of the interior northern portion of the central Delta could alter foodweb productivity and tidal freshwater habitat conditions that could limit production of anadromous fishes in the area .	
Proposed habitat improvements along upgraded levees (e.g., shallow slopes and vegetated berms) could improve rearing and migratory habitat.	Construction and operation of north Delta conveyance features could reduce habitat values and foodweb productivity.	
Potential benefit of increased freshwater inflow to Delta and Bay and reductions in exports and export related losses of fish through water conservation if saved water is used to augment freshwater inflow to the Delta.	An isolated conveyance facility could result in entrainment, predation, and impingement losses of Sacramento fish at the intake of the facility. Juvenile fish would be vulnerable to handling effects at intake screens.	

* Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Further development of water transfers could lead to reductions in exports at high risk times of the year, which could reduce losses of anadromous fishes at project pumping plants or adverse habitat changes caused by water exports.</p>	<p>An isolated conveyance facility would lead to reduced flow rates in the mainstem Sacramento River below the point of diversion, and a greater proportion of this reduced flow would enter the central Delta.</p>	
<p>Alteration of channels in the south Delta could improve habitat in altered and other channels, which could lead to greater foodweb productivity, improved migrating and rearing habitat, and reduced entrainment and salvage losses at south Delta pumping plants.</p>		
<p>Improvements to CVP-SWP conveyance features at south Delta pumping plants (e.g., Joint Point of Diversion) could reduce vulnerability of anadromous fish to entrainment and salvage losses at the intakes of the facilities.</p>		
<p>An isolated conveyance facility could improve migrating, rearing, and feeding habitat, improve foodweb productivity, reduce losses to water diversions, and improve transport of juvenile fish to optimum rearing areas in the Delta and Bay, especially for San Joaquin River salmonids.</p>		
<p>More natural river flows, improved sediment supplies, and enhancement and restoration of aquatic and SRA habitats associated with major Bay-Delta tributaries would improve spawning, rearing, and migrating habitat for anadromous fish.</p>		

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table S: Anadromous Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects ¹	Potential Adverse Effects ¹	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Improvements to passage routes could increase access to spawning and rearing areas.,		
Reduction of predation levels on juvenile anadromous fish could result in increasing numbers of juveniles successfully outmigrating to the Bay-Delta.		
Improvement in the genetic integrity of anadromous fish stocks could improve spawning success, juvenile survival, and adult homing success.		

¹ Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures

MSCS User Guide: This table lists the types of beneficial and adverse effects on the NCCP fish group of implementing all CALFED Programs and conservation measures that may be necessary to avoid, minimize, or compensate for adverse impacts on the fish group. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see Table 5.1). Because this table only presents a summary list of effects and conservation measures, this table does not identify which conservation measures may be applicable to avoiding, minimizing, or compensating for a particular adverse effect. Detailed descriptions of potential effects and conservation measures for each NCCP community by CALFED region and summary outcome are presented in MSCS Technical Report: Evaluation Tables and MSCS Conservation Measures for NCCP Communities. This table also lists the evaluated species that are associated with the NCCP fish group. The potential for a particular species to be beneficially or adversely effected by Program actions is presented in Table 2-2.

Associated Evaluated Species: Tidewater goby, delta smelt, longfin smelt, Sacramento splittail, and Sacramento perch.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Improved fall, winter, and spring flows through the Delta would improve spawning, rearing, and migration habitat conditions for estuarine fish which could result in higher fish survival and population levels.	Reallocation of seasonal and multi-year water supplies to enhance spring and fall river flows and Delta inflow could limit available water supply in other seasons and future years particularly during critical years and extended droughts, which could adversely affect survival of native estuarine fish at those times.	Implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outfall criteria deemed essential in maintaining native estuarine fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of program actions. Measures may include additional dedicated surface or ground water stored specifically for this purpose, special options for the purchase of needed additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is to initially implement the actions to the extent feasible to determine potential effects on seasonal and critical year water supplies, and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years.

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>An increase in inflow in spring would increase the frequency of low salinity zone being located in more productive shallow bays of the Western Delta and North Bay rather than interior Delta channels, which could lead to higher estuarine food production and greater estuarine juvenile fish survival and higher population levels.</p>		<p>To the consistent with Program objectives, construct and operate in-channel barriers and restrictions to provide sufficient leeway to adjust hydraulics in various channels to ensure fish are not being drawn in greater numbers or proportions toward the pumps, or being affected by poor water quality. Implement monitoring and testing necessary to design, construct, and operate barriers and restrictions. Develop and implement procedures and operating criteria for barrier systems to protect fish. Implement monitoring and testing necessary to ensure against excessive movement of fish toward the south Delta pumping plants.</p>
<p>Increased spring inflow would increase river silt load and flood more shoreline vegetation, which may reduce predation through greater turbidity and increase the available escape habitat, which could increase survival and population abundance of native estuarine fish.</p>		<p>To the consistent with Program objectives, constrain the closure of the DCC from November through January as necessary to minimize the extent of fish exposure to the south Delta pumping plants. Implement monitoring and testing necessary to provide the necessary balance between reducing loss of fish from the Sacramento River and the West, Central, and South Delta.</p>
<p>Increased spring inflow would reduce competition from non-native species adversely affected by increased flows or seasonally lower Bay-Delta salinity levels (e.g., Asian clams), which could lead to greater survival and higher population levels of native estuarine fish.</p>		<p>To the consistent with Program objectives, constrain the closure of the DCC from November through January as needed to allow necessary San Joaquin River attractions flows for fish to move into and upstream of the Central and South Delta.</p>

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Increased spring and fall Bay-Delta inflow would reduce the loss of native estuarine fish to water diversions by decreasing the amount of water diverted and reducing negative flows in the lower San Joaquin River portion of the Delta, which could lead to greater survival and higher population levels.</p>	<p>Operation of a barrier at the head of Old River during key periods could increase export losses of fish residing in the West, Central, and South Delta.</p>	<p>To the consistent with Program objectives, constrain operation of a barrier at the head of Old River during key periods as necessary to minimize the extent of fish exposure to the South Delta pumping plants. Implement monitoring and testing necessary to balance the loss of fish from the San Joaquin River, and the West, Central, and South Delta.</p>
<p>Increased spring inflow may reduce the concentrations of toxins, which could lead to greater survival and higher population levels of native estuarine fish.</p>	<p>Construction and other disturbance-causing activities associated with implementing particular Program actions could result in mortality of estuarine fish species.</p>	<p>To the extent practicable, avoid construction activities during periods estuarine fish species would be most susceptible to adverse affects that could be associated with implementing proposed actions.</p>
<p>Restoration of up to 66,000 acres of tidal shallow water and emergent wetland habitat and up to 190 miles of tidal sloughs in the Bay-Delta would substantially increase the area spawning and rearing habitat, and could substantially improve foodweb productivity, which could increase survival and population levels of native estuarine fish.</p>	<p>Reactivation of flow to historic overflow basins and restoration of tidal wetlands may lead to stranding of native estuarine fish if sufficient drainage is not provided, which could reduce survival and population abundance.</p>	<p>To the extent practicable, avoid implementing proposed actions in occupied habitat areas that could have a substantial adverse affect on the distribution or abundance estuarine fish species.</p>
<p>Restricting flow toward the export pumps in some Delta channels will increase residence time of water, which could potentially improve foodweb productivity and reduce export losses of native estuarine fish.</p>	<p>Enhancement and restoration of aquatic and tidal wetland habitat area may increase abundance of non-native species by providing additional habitat. Non-native species may compete with or prey on these species, reducing survival and population abundance.</p>	<p>Consistent with Program objectives, design and construct overflow basins from existing leveed lands in stages using construction design and operating schemes and procedures developed through pilot studies and project experience to minimize the potential for stranding as waters recede from overflow areas.</p>

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Closure of the DCC particularly in the November through January period would increase net freshwater inflow into the Western Delta from the Sacramento River, which could improve transport of Sacramento River fish to the shallow bays of the Western Delta and Suisun Bay, improve habitat in those areas, and lessen their export at south Delta pumping plants, which in turn could improve survival and population abundance of native estuarine fish.</p>	<p>Reactivation of flows to historic overflow basins and enhancement and restoration of aquatic and tidal wetland habitat areas could have some short-term negative effects on native estuarine fish as a result of changes in hydraulics, water quality, and habitat conditions.</p>	<p>Consistent with Program objectives, design shallow-water habitat enhancements and restorations to address the habitat needs of native estuarine fish and avoid providing optimal conditions for non-native species.</p>
<p>Improved operation of the barrier at the head of Old River could reduce the losses of native estuarine fish moving from the Bay and Western Delta toward the eastern Delta and lower San Joaquin channel to export pumps in the South Delta and would improve water quality in the eastern Delta including the San Joaquin River channel near Stockton, which may improve native estuarine fish survival and population abundance in that portion of the Delta.</p>	<p>Filling Delta channels to create channel islands could result in the loss of small amounts of shallow-water habitat.</p>	<p>Consistent with Program objectives, develop and implement methods that minimize potential effects on hydraulics, water quality, and habitat on estuarine fish species when restoring tidal wetlands from subsided leveed lands.</p>
<p>Improving and restoring Yolo Bypass channels and Bypass draining could reduce stranding losses of native estuarine fish in the Bypass and provide added spawning and rearing habitat, improve foodweb productivity in the Bypass and Delta, which could increase survival and population abundance.</p>	<p>Temporary and localized increases in turbidity could result from construction required to implement habitat restoration or other Program actions.</p>	<p>Consistent with Program objectives, construct channel islands in sloughs that have relatively poor shallow-water and SRA habitats such that the net gain in these habitats is positive.</p>

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Protection, enhancement, and restoration of riparian habitat along channels and channel islands would increase SRA habitat and shallow-water edge habitat, which could provide more spawning and rearing habitat, as well as improve foodweb productivity, which, in turn, would increase survival and population abundance of native estuarine fish.</p>	<p>An increase in agricultural water diversions in the Delta during winter to create shallow flooded habitats could reduce net downstream transport of some estuarine larvae and juveniles through the Delta, which could reduce juvenile production and adult populations of native estuarine fish.</p>	<p>To the extent practicable, confine additional pumping to times and area to channels with minimal concentrations of fish.</p>
<p>Re-establishment of hydrologic connectivity to historic overflow basins may provide additional spawning and rearing habitat in flood years that could increase reproduction, survival, and population levels native estuarine fish.</p>	<p>Consolidated larger and fewer diversions and positive-barrier bypass-screen systems could increase entrainment, impingement, and predation losses of native estuarine fishes and therefore decrease survival and population abundance.</p>	<p>Install screens on new diversions to avoid entrainment of juvenile and adult estuarine fish.</p>
<p>Avoiding dredging at important times and places in the Delta would help improve native estuarine fish feeding habitats and potentially lead to improved populations.</p>	<p>Upgrading levees could degrade existing riparian, wetland, and SRA habitats along existing levees and potentially reduce survival and therefore decrease production and population levels of native estuarine fish.</p>	<p>Consistent with Program objectives, confine additional winter diversions necessary to manage restored seasonal habitats to non-dry years when water supplies are sufficient to minimize any effects on downstream transport, export pumping ratios, and foodweb productivity.</p>
<p>Limiting abundance of non-native aquatic species may reduce competition and predation, and thus increase survival and population abundance of native estuarine fish.</p>	<p>Reducing the total loadings of organic material in the aquatic environment could reduce foodweb productivity, which could reduce production and population abundance of native estuarine fish.</p>	<p>Consistent with Program objectives, place consolidated intakes in areas that support minimal numbers of native estuarine fish, particularly delta smelt.</p>
<p>Consolidating diversions and upgrading fish screens and handling systems could reduce entrainment losses and lead to an increase in survival and population levels of native estuarine fish.</p>	<p>Further development of water transfers could lead to a shift in water diversions from the Delta to periods with higher risk of losses to entrainment.</p>	<p>Design and construct a new fish-screen system at the entrance to Clifton Court Forebay to alleviate the loss of native estuarine fish to predation in the forebay and to the existing fish-bypass and collection facility within the forebay.</p>

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
Reduction in the loss of juvenile and adult fish to illegal net fishing and in the legal sport fishery in the Delta could increase the population levels of native estuarine fish.	Alteration of conveyance features at south Delta pumping plants could increase the pumping capacity, which could lead to increasing entrainment and salvage losses of native estuarine fish at the intake facilities.	Screen intakes or connect intakes of the Tracy Pumping Plant (Central Valley Project) to the screened Clifton Court Forebay to alleviate loss of native estuarine fish at the Tracy Fish Protection Facility.
Reduction in the levels of contaminants being released into Delta channels could increase foodweb productivity and improve survival, leading to increased production and higher population levels of native estuarine fish.	The discharge of Sacramento River water into the interior Delta via Snodgrass Slough could result in some estuarine fishes (e.g. splittail) being drawn up to the discharge point during annual spawning migrations up the Sacramento River.	Screen all Delta diversions that may entrain native estuarine fish.
Proposed habitat improvements along upgraded levees (e.g., shallow slopes and vegetated berms) could improve rearing habitat and potentially increase production and population levels of native estuarine fish.	Diversion of Sacramento River water into Snodgrass Slough could lead to entrainment and salvage losses of estuarine fish diverted from the Sacramento River.	Restore or enhance 1 to 3 times the amount of nearshore habitat affected by levee upgrades near where impacts are incurred.
Increased freshwater inflow to Delta and Bay and reductions in exports and export related losses of native estuarine fish through water conservation if saved water is used to augment freshwater inflow to the Delta.	Diversion of Sacramento River water into Snodgrass Slough without screening could result in greater numbers of native estuarine fish from the Sacramento River being drawn into the interior Delta where they may have poorer habitat and greater chance of being entrained or salvaged at south Delta pumping plants.	Include project design features that allow for on-site re-establishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction.
Further development of water transfers could lead to reductions in exports at high risk times of the year, which could reduce losses of native estuarine fish at project pumping plants or adverse habitat changes caused by water diversions.	The increase in flushing rate of the interior northern portion of the central Delta could alter foodweb productivity and tidal freshwater habitat conditions that could limit production of native estuarine fishes in the area.	Reductions in unnatural inputs of organic carbon could be replaced with increased natural organic inputs such as from restored tidal wetlands and riparian habitats.

Table T: Estuarine Fish Group: Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures (continued)

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the Program to Compensate for Potential Adverse Effects of the Program
<p>Alteration of channels in the south Delta could improve habitat in altered and other channels, which could lead to greater foodweb productivity, improved spawning and rearing habitat, and reduced entrainment and salvage losses of native estuarine fish at south Delta pumping plants.</p>	<p>An isolated conveyance facility could increase entrainment losses of native estuarine fish in the North Delta at CVP and SWP project diversions. Larval fish in the Sacramento River near the proposed intake would be more vulnerable to entrainment. Juvenile and adult fish would be vulnerable to handling effects at intake screens.</p>	<p>Water transfers should be conducted so as not to increase exports during key times of the year when estuarine fish are more vulnerable to damage or loss at project facilities.</p>
<p>Improvements to CVP-SWP conveyance features at south Delta pumping plants (e.g., Joint Point of Diversion) could reduce vulnerability of native estuarine fish to entrainment and salvage losses at the intakes of the facilities.</p>		<p>Construction and operation of new conveyance features in the south Delta to the pumping plants should be such as to minimize losses of estuarine fishes.</p>
<p>An isolated conveyance facility could improve spawning, rearing, and feeding habitat, improve foodweb productivity, reduce losses to water diversions, and improve transport of juvenile native estuarine fish to optimum rearing areas in the Delta and Bay.</p>		<p>Design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating native estuarine fishes, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for native estuarine fish.</p>
<p>Improved sediment supplies and improve riverine aquatic habitat conditions could improve floodplain spawning and rearing habitats for selected estuarine species (e.g., Sacramento splittail), which could improve species survival and abundance.</p>		
<p>Improvements to passage routes in floodplains for the Sacramento splittail could increase access to spawning and rearing areas.</p>		



Attachment 5

Prescriptions and Conservation Measures for Species



Table A: Prescriptions and Conservation Measures for Species with “R” Goals

MSCS User Guide: This table presents prescriptions and conservation measures for evaluated species with a “R” goal (species prescriptions follow the name of the species). Conservation measures to avoid, minimize, or compensate for potential adverse impacts on species may be less appropriate or more appropriate than others for addressing a specific type or level of impact on an species. Conservation measures that add detail to Program actions would achieve prescriptions (i.e., species habitat or population targets that, if met, achieve species goals) for species with a “R” goal when implemented in combination with conservation measures to avoid, minimize, and compensate for Program impacts. These conservation measures represent the range of actions that may be required to ensure that prescriptions for species with a “R” goal are achieved.. The need to implement a particular conservation measure for achieving “R” goals will depend on the response of “R” species populations to ERP and other Program actions as they are implemented.

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Suisun ornate shrew (<i>Sorex ornatus sinuosus</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the Suisun ornate shrew and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area.</p>	
<ol style="list-style-type: none"> 1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the Suisun ornate shrew should be: 1) western Suisun Marsh, 2) Napa Marshes and eastern Suisun Marsh, and 3) Sonoma Marshes and Highway 37 marshes west of Sonoma creek. 2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives. 3. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat. 	<ol style="list-style-type: none"> 1. Conduct surveys to determine the presence and distribution of Suisun ornate shrews in suitable habitat before implementing Program actions that could result in the loss or degradation of habitat. 2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied habitat areas. 3. Minimize the adverse effects of the artificial stabilization of salinity ranges.

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>4. To the extent practicable, direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).</p>	<p>4. To the extent consistent with Program objectives, avoid restoring tidal action to diked marshes that are occupied by Suisun ornate shrews until restoration of at least twice as much tidal, high marsh, and wetland to upland transition habitat as would be affected by restoration of tidal exchange has been initiated in the western Suisun marsh. In addition, an equal amount of occupied habitat in the eastern Suisun Marsh as would be affected by restoration of occupied habitat will be maintained as managed marsh to provide suitable species habitat area until newly restored habitat in the western Suisun marsh has developed sufficiently to provide suitable Suisun ornate shrew habitat.</p>
<p>5. Restore wetland and perennial grassland habitats adjacent to occupied habitats to create a buffer of natural habitat to protect populations from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide habitat suitable for the natural expansion of populations.</p>	
<p>6. To the extent practicable, design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent practicable, transition habitat zones should be at least 0.25 mile in width.</p>	
<p>7. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements for the Suisun ornate shrew.</p>	
<p>8. Direct salt marsh habitat enhancements and restorations towards increasing habitat connectivity among existing and restored tidal marshes within the range of the Suisun ornate shrew.</p>	
<p>9. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.</p>	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>10. Identify and implement feasible methods for controlling invasive non-native marsh plants.</p> <p>11. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.</p> <p>12. Provide interim management of occupied salt marshes to maintain source populations until restored habitats have developed sufficiently to provide suitable habitat.</p> <p>13. Acquire conservation easements to adjust grazing regimes to enhance wetland to upland transition habitat conditions in occupied habitat areas.</p> <p>14. Conduct research to determine use of restored salt marsh habitats by Suisun ornate shrews and the rate at which restored habitats are colonized.</p>	<p>1. Conduct surveys to determine the presence and distribution of San Pablo song sparrows in suitable nesting habitat before implementing Program actions that could result in the loss or degradation of habitat.</p> <p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied nesting habitat areas.</p>
<p>San Pablo song sparrow (<i>Melospiza melodia samuelis</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the San Pablo song sparrow and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area.</p>	
<p>1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the San Pablo song sparrow should be: 1) Gallinas/Ignacio marshes and Napa Marshes, 2) Sonoma Marshes, Petaluma Marshes, and Highway 37 marshes west of Sonoma creek, 3) Point Pinole Marshes, and 4) Highway 37 marshes east of Sonoma Creek.</p> <p>2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>3. Restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide suitable foraging habitat and nesting habitat area suitable for the natural expansion of populations.</p>	<p>3. Avoid disturbances that could be associated with implementing Program actions near active nest sites during the nesting period (April - July).</p>
<p>4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat.</p>	
<p>5. Design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.</p>	
<p>6. To the extent practicable, direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).</p>	
<p>7. Design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.</p>	
<p>8. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the San Pablo song sparrow.</p>	
<p>9. Identify and implement feasible methods for controlling invasive non-native marsh plants.</p>	
<p>10. Conduct research to determine use of restored salt marsh habitats by San Pablo song sparrows and the rate at which restored habitats are colonized.</p>	
<p>12. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.</p>	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Suisun song sparrow (<i>Melospiza melodia maxillaris</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the Suisun song sparrow and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area and the Delta Region.</p>	
<p>1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the Suisun song sparrow should be: 1) western Suisun Marsh, 2) eastern Suisun Marsh, 3) the Contra Costa County Shoreline.</p>	<p>1. Conduct surveys to determine the presence and distribution of Suisun song sparrows in suitable nesting habitat before implementing Program actions that could result in the loss or degradation of habitat.</p>
<p>2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied nesting habitat areas.</p>
<p>3. Restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide suitable foraging habitat and nesting habitat area suitable for the natural expansion of populations.</p>	<p>3. Avoid disturbances that could be associated with implementing Program actions near active nest sites during the nesting period (mid-March - July).</p>
<p>4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat.</p>	<p>4. Minimize the adverse effects of the artificial stabilization of salinity ranges.</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>5. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.</p>	<p>5. To the extent consistent with Program objectives, avoid restoring tidal action to diked marshes that are occupied by Suisun song sparrows until restoration of at least twice as much tidal, high marsh, and wetland to upland transition habitat as would be affected by restoration of tidal exchange has been initiated in the western Suisun marsh. In addition, an equal amount of occupied habitat in the eastern Suisun Marsh as would be affected by restoration of occupied habitat will be maintained as managed marsh to provide suitable species habitat area until newly restored habitat in the western Suisun marsh has developed sufficiently to provide suitable Suisun song sparrow habitat.</p>
<p>6. To the extent practicable, direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).</p>	
<p>7. Design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.</p>	
<p>8. Control non-native invasive plants in existing salt marshes where non-native plants have degraded habitat quality and in salt marshes restored under the ERP.</p>	
<p>9. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the Suisun song sparrow.</p>	
<p>10. Direct salt marsh habitat enhancements and restorations towards increasing habitat connectivity among existing occupied and restored tidal marshes.</p>	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>11. To the extent practicable, direct ERP restorations to improve tidal circulation to diked wetlands that currently sustain partial tidal exchange.</p> <p>12. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.</p> <p>13. Identify and implement feasible methods for controlling invasive non-native marsh plants.</p> <p>14. Conduct research to determine use of restored salt marsh habitats by Suisun song sparrows and the rate at which restored habitats are colonized.</p> <p>15. Acquire conservation easements to adjust grazing regimes to enhance wetland to upland transition habitat conditions.</p>	<p>1. Implement conservation measures in: a) biological opinions, including the 404 NWP, GP, and PL84-99 Corps flood relief biological opinions, bc) the CVPLA biological assessment, and c) DEFT reports.</p> <p>2. To the extent consistent with Program objectives, retire agricultural land in the south Delta to minimize the need for barrier installation.</p>
<p>Delta smelt (<i>Hypomesus transpacificus</i>): Distribution Criteria: The fall mid-water trawl survey in September and October must capture delta smelt in all zones in 2 out of 5 consecutive years and in at least 2 zones in 3 out of the 5 consecutive years, and in at least 1 zone in all 5 years; and the 5 consecutive years must include 2 sequential extreme outflow years (i.e., at least one critical or dry year followed by a critical, dry, or wet year).</p>	
<p>Abundance Criteria: The fall mid-water trawl catch for September and October must exceed 239 for 2 out of 5 years and not fall below 84 for more than 2 consecutive years.</p>	
<p>1. Coordinate protection, enhancement, and restoration of occupied delta smelt habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, and USFWS recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>1. Implement conservation measures in: a) biological opinions, including the 404 NWP, GP, and PL84-99 Corps flood relief biological opinions, bc) the CVPLA biological assessment, and c) DEFT reports.</p> <p>2. To the extent consistent with Program objectives, retire agricultural land in the south Delta to minimize the need for barrier installation.</p>
<p>2. To the extent consistent with Program objectives, direct ERP actions towards setting back levees in the south Delta to increase shallow water habitat.</p>	<p>2. To the extent consistent with Program objectives, retire agricultural land in the south Delta to minimize the need for barrier installation.</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
3. Restore and enhance delta smelt habitat to provide suitable water quality (i.e., low concentrations of pollutants) and substrates for egg attachment (submerged tree roots, branches, rock, and emergent vegetation) to important spawning areas.	3. Identify and pursue opportunities to provide operational flexibility of the CVP and SWP to eliminate or reduce the need for installation of barriers in the south Delta.
4. Expand IEP monitoring efforts in the south Delta for delta smelt.	4. Consistent with Program objectives, avoid using hard structures (i.e., rip rap) to stabilize banks.
5. To the extent consistent with Program objectives, initiate implementation of the Service’s “Rainbow Report” or similar documentation to provide increased water quality in the south Delta and eliminate or reduce the need for installation of barriers.	5. To the extent consistent with Program objectives, avoid implementing channel modification activities near channel islands, shoals, and shoreline areas with emergent vegetation.
6. Monitor to determine if artificial substrates are used by delta smelt for spawning.	6. To the extent practicable, avoid dredging within 200 feet of the shoreline and 250 feet of any water 4 feet or less (MLLW) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin rivers).
7. Protect critical rearing habitat from high salinity (>2 ppt) and high concentration of pollutants from the beginning of February to the end of August.	7. Consistent with Program objectives, dredging or water side activities required to implement Program actions should not occur in shallow water (<3m) areas of the Bay and Delta.
8. Allow delta smelt unrestricted access to suitable spawning habitat and protect these areas from physical disturbance (e.g., heavy equipment operation) and flow disruption in the period from December to July by maintaining adequate flow and suitable water quality to attract migrating adults in the Sacramento and San Joaquin River channels and their tributaries, including Cache and Montezuma sloughs and their tributaries.	8. Consistent with Program objectives, construction of waterside rock berms and backfill should be avoided in critical spawning and rearing areas.
9. To the extent consistent with Program objectives, protect the Sacramento and San Joaquin river and tributary channels from physical disturbance (e.g. sand and gravel mining, diking, dredging, and levee or bank protection and maintenance) and flow disruption (e.g., water diversion that result in entrainment and in-channel barriers or tidal gates) for the period February 1 to August 31.	9. All in-channel modification projects implemented under the Program should use best management practices to minimize mobilization of sediments that might contain toxins, localize sediment movement, and reduce turbidity.

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
	<p>10. Before implementing Program actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to delta smelt. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.</p> <p>11. To the extent practicable, avoid the use of creosote pilings to construct in-water structures.</p> <p>12. Program actions that have temporary impacts on shallow water habitat within the range of the delta smelt will protect or restore one acre of in-kind habitat for each acre of affected habitat.</p> <p>13. Program actions that have long-term (greater than 1 year) impacts on shallow water habitat shall protect or restore three acres of in-kind habitat for each acre of affected habitat.</p>
<p>Longfin smelt (<i>Spirinchus thaleichthys</i>): The recovery goal will be achieved when 1) the fall mid-water trawl surveys in September and October result in the capture of longfin smelt in all zones in 5 out of 10 years, 2) in 2 zones for an additional year, 3) in at least one zone during 3 of the 4 remaining years in the 10 year period with no failure to meet site criteria in consecutive years, and 4) abundance must be equal to or greater than predicted abundance for 5 of the 10 year period.</p>	
<p>1. Coordinate protection, enhancement, and restoration of occupied longfin smelt habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, and USFWS recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. Improve January and February flows for the longfin smelt during the second and subsequent years of drought periods.</p>	<p>1 Consistent with Program objectives, channel modification activities should avoid channel islands, shoals, and shoreline areas with emergent vegetation.</p> <p>2. Consistent with Program objectives, no dredging should be conducted within 200 feet of the shoreline and 250 feet of any water 4 feet or less (MLLW) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin rivers).</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
3. Provide sufficient Delta outflows for the longfin smelt during from December through March.	3. Consistent with Program objectives, dredging or water side activities should not occur in shallow water (<3m) areas of the Bay and Delta.
4. Provide suitable water quality and substrates for egg attachment (submerged tree roots, branches, rock, and emergent vegetation) to spawning areas in the Delta and tributaries of northern Suisun Bay.	4. Consistent with Program objectives, construction of waterside rock berms and backfill should be avoided in critical spawning and rearing areas.
5. Provide unrestricted access to suitable spawning habitat and protect these areas from physical disturbance (e.g., heavy equipment operation) and flow disruption in the period from December to July by maintaining adequate flow and suitable water quality to attract migrating adults in the Sacramento and San Joaquin River channels and their tributaries, including Cache and Montezuma sloughs and their tributaries.	5. Implementation of Program actions that require in-channel modification projects should use best management practices to minimize mobilization of sediments that might contain toxins, localize sediment movement, and reduce turbidity.
6. Conduct research to determine the relationship between X2 and longfin smelt abundance and distribution.	6. Before implementing Program actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to delta smelt. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.
7 Consistent with Program objectives, mobilize organic carbon in the Yolo Bypass to improve food supplies by ensuring flow through the bypass at least every other year.	7. Program actions that have temporary impacts on shallow water habitat within the range of the longfin smelt will protect or restore one acre of in-kind habitat for each acre of affected habitat.
8 Consistent with Program objectives, operate diversions to minimize adverse affects of diversions on longfin smelt during the peak spawning period (January - March).	8. Program actions that have long-term (greater than 1 year) impacts on shallow water habitat shall protect or restore three acres of in-kind habitat for each acre of affected habitat.
9 Protect the Sacramento and San Joaquin river and tributary channels from physical disturbance (e.g. sand and gravel mining, diking, dredging, and levee or bank protection and maintenance) and flow disruption (e.g., water diversion that result in entrainment and in-channel barriers or tidal gates) for the period February 1 to August 31.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
10. Protect critical rearing habitat from high salinity (>2 ppt) and high concentration of pollutants from the beginning of February to the end of August.	
Green sturgeon (<i>Acipenser medirostris</i>): The recovery goal will be achieved when 1) the median population of mature fish (over 1 meter in length) has reached 1,000 fish, including 500 females over 1.3 meters in total length, over a 50 year period or for 5 generations.	
1. Coordinate protection, enhancement, and restoration of occupied and historic green sturgeon habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.	
2. Provide inflows to the Delta from the Sacramento River greater than 25,000 cfs during the March to May spawning period in at least 2 of every 5 years.	
3. Identify and implement measures to eliminate stranding of green sturgeon in the Yolo Bypass or to return stranded fish to the Sacramento River.	
4. Conduct research in the MSCS focus area to determine green sturgeon habitat requirements, distribution, spawning habitat flow requirements, and factors limiting population abundance.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Winter-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [wr]): The mean annual spawning abundance over any 13 consecutive years will be 10,000 females. The geometric mean of the Cohort Replacement Rate over those same 13 years will be greater than 1.0. Estimates of these criteria will be based on natural production alone and will not include hatchery-produced fish. If the precision for estimating spawning run abundance has a standard error greater than 25%, then the sampling period over which the geometric mean of the Cohort Replacement Rate is estimated will be increased by one additional year for each 10% of additional error over 25%.</p>	
<ol style="list-style-type: none">1. Coordinate protection, enhancement, and restoration of occupied and historic winter-run chinook habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.2. Implement management measures identified in the proposed recovery plan for the Sacramento River winter-run chinook salmon (NMFS 1997).3. To the extent consistent with Program objectives, manage operations at the Red Bluff diversion dam to improve fish passage, reduce the level of predation on juvenile fish, and increase fish survival.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Central Valley fall-run chinook salmon (<i>Oncorhynchus tshawytscha</i> [ft]): Late-fall Sacramento run: Achieve species recovery by 1) increasing the number of wild spawning fish in the Sacramento River to a mean number of 22,000 fish and maintain the population such that it does not drop below 15,000 fish for 15 years, three of which are dry or critical and 2) achieving juvenile survival rates that approach pre-CVP and SWP levels following years when the adult populations are fewer than 15,000 fish in the Sacramento River.</p>	
<p>San Joaquin Fall Run: Achieve species recovery by 1) increasing the number of naturally spawning fish in the Stanislaus, Tuolumne, and Merced rivers to a median number of 20,000 fish and maintaining a three-year running average that does not drop below 3,000 fish for 15 years, three of which are dry and critical and 2) achieving smolt survival rates that approach pre-CVP and SWP levels when adult numbers decline to fewer than 3,000 natural spawning fish.</p>	
<p>Sacramento Fall Run: Restore self sustaining populations to all their native streams, except those above Shasta Reservoir, with numbers to exceed the average of both hatchery and wild origin from 1980-1998.</p>	
<hr/> <ol style="list-style-type: none"><li>1. Coordinate protection, enhancement, and restoration of occupied and historic Central Valley fall-run chinook habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.<li>2. Implement applicable management measures identified in the restoration plan for the Anadromous Fish Restoration Program (USFWS 1997) and the recovery plan for the native fishes of the Sacramento/San Joaquin Delta (USFWS 1996).<li>3. Operate hatcheries such that the maintenance and expansion of natural populations are not threatened by the release of hatchery fish.<li>4. To the extent consistent with Program objectives, manage operations at the Red Bluff diversion dam to improve fish passage, reduce the level of predation on juvenile fish, and increase fish survival.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
5. To the extent consistent with Program objectives, manage export flows from the San Joaquin River to improve conditions for upstream migration of adult fish (i.e., attraction flows).	
6. To the extent consistent with Program objectives, operate physical barriers in the Delta in a manner to assist in achieving recovery goals.	
7. Continue research to determine causes for low outmigration survival of fish from the San Joaquin River in the South Delta and identify and implement measures to improve outmigration survival.	

Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha [sr]*): Recommendations are based on current scientific information presently available regarding metapopulation structure and abundance of spring-run, accepted principles of conservation biology for anadromous fish populations and best professional judgement. Refinement of the recovery goals will be undertaken by DFG in cooperation with NMFS following the same methodology used to develop recovery goals for the Sacramento winter-run chinook salmon (as described in the National Marine Fisheries Service’s draft Recovery Plan for Sacramento River winter-run chinook salmon).

Restore viable self-sustaining populations of Sacramento spring-run chinook salmon with sufficient interconnectivity throughout a significant portion of their range within the Sacramento River watershed (including but not limited to Mill, Deer, Antelope, Butte, Big Chico, Beegum, South Fork Cottonwood, Clear, and Battle creeks; Yuba River). Attainment of the recovery goals would eliminate the likelihood of extinction in the foreseeable future.

Attainment of specified annual abundance recovery criteria shall cover a minimum 15 years which constitutes five times a generation time. The population’s annual escapement can not drop below the critical threshold during any of the 15 consecutive years. The geometric mean of a Cohort Replacement Rate for each population of spring-run over the 15-year period will be greater than 1.0. Estimates of these criteria will be based on natural production alone and will not include hatchery-produced fish. If the precision for estimating spawning run abundance has a standard error greater than 25%, then the sampling period over which the geometric mean of the Cohort Replacement Rate is estimated will be increased by one additional year for each 10% of additional error over 25%.

Feather River: 4,700 adult annual escapement. This is the present mitigation obligation of Feather River Hatchery for spring-run. This obligation is additional to recovery goals for naturally-reproducing populations in other Sacramento River system streams.

Mill Creek: 2,500 adult annual escapement (The critical threshold is 250 adult annual escapement). The recent historic maximum annual adult escapement was 4,000 (DFG 1998).

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<ol style="list-style-type: none">1. Coordinate protection, enhancement, and restoration of occupied and historic Central Valley spring-run chinook habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.2. Implement applicable management measures identified in the restoration plan for the Anadromous Fish Restoration Program (USFWS 1997) and the recovery plan for the native fishes of the Sacramento/San Joaquin Delta (USFWS 1996).3. Operate physical barriers in the Delta in a manner to assist in achieving recovery goals.4. Manage operations at the Red Bluff diversion dam to improve fish passage, reduce the level of predation on juvenile fish, and increase fish survival.	<p>Central Valley steelhead (<i>Oncorhynchus mykiss [cv]</i>) evolutionarily significant unit: Adopt the recovery criteria in the recovery plan in preparation. The interim prescription is to increase Sacramento River populations to maintain a minimum of 13,000 adult steelhead spawning upstream of the Red Bluff Diversion Dam; restore self-sustaining populations of steelhead to all streams that provide suitable habitat and historically supported steelhead populations, or could be restored to provide suitable habitat with the implementation of reasonable restoration and protection measures; and increase populations such that numbers of fish of natural origin equal or exceed the average number of fish of both hatchery and natural origin from 1980-1998.</p>
<ol style="list-style-type: none">1. Coordinate protection, enhancement, and restoration of occupied and historic Central Valley steelhead ESU habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.2. Implement applicable management measures identified in the restoration plan for the Anadromous Fish Restoration Program (USFWS 1997), the recovery plan for the native fishes of the Sacramento/San Joaquin Delta (USFWS 1996),	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>3. Implement management measures and recommended by DFG (CDFG 1998) that are applicable to Program actions and achieving CALFED objectives.</p> <p>4. To the extent consistent with Program objectives, minimize flow fluctuations to reduce or avoid stranding of juveniles.</p>	
<p>Sacramento splittail (<i>Pogonichthys macrolepidotus</i>): Species recovery objectives will be achieved when two of the following three criteria are met in at least 4 of every 5 years for a 15 year period: 1) the fall mid-water trawl survey numbers must be 19 or greater for 7 of 15 years, 2) Suisun Marsh catch per trawl must be 3.8 or greater and the catch of young-of-year must exceed 3.1 per trawl for 3 of 15 years, and 3) Bay Study otter trawls must be 18 or greater AND catch of young-of-year must exceed 14 for 3 out of 15 years.</p>	
<p>1. Coordinate protection, enhancement, and restoration of occupied and historic Central Valley steelhead ESU habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. To the extent consistent with Program objectives, remove diversion dams that block splittail access to lower floodplain river spawning areas.</p> <p>3. Consistent with Program objectives, limit changes in the timing and volume of freshwater flows in the rivers to the Bay-Delta.</p> <p>4. Direct ERP actions towards setting back levees in the south Delta to increase shallow water habitat.</p> <p>5. To the extent consistent with Program objectives, reduce the extent of reversed flows in the lower San Joaquin and Delta during the period from February through June.</p>	<p>1. Consistent with Program objectives, limit dredging, diking, and filling of occupied shallow water habitats.</p> <p>2. Identify and pursue opportunities to provide operational flexibility of the CVP and SWP to eliminate or reduce the need for installation of barriers in the south Delta.</p> <p>3. Consistent with Program objectives, avoid using hard structures (i.e., rip rap) to stabilize banks.</p> <p>4. Consistent with Program objectives, construct and operate barriers in the Delta to minimize the threat to splittail from enhancing transport of water to south Delta pumping plants.</p> <p>5. Consistent with Program objectives, conduct water transfers at times of the year that would not increase exposure of splittail to south Delta pumping plants.</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
6. Reduce the loss of splittail at south Delta pumping plants from predation and salvage handling and transport.	
7. Reduce the loss of young splittail to entrainment into south Delta pumping plants.	
8. To the extent practicable, reduce the loss of splittail at 1800 unscreened diversions in the Delta.	
9. Consistent with Program objectives, reduce losses of adult splittail spawners during their upstream migrations to recreational fishery harvest.	
10. To the extent consistent with Program objectives, improve Delta water quality particularly in dry years when pesticide levels and total dissolved solids are high.	
11. Consistent with Program objectives, reduce the concentration of pollutants in the Colusa Basin Drain and other agricultural drains into the Bay-Delta and its watershed.	
12. Consistent with Program objectives, modify operation of the DCC to minimize potential to increase exposure of splittail population in the Delta to the south Delta pumping plants.	
13. Consistent with Program objectives, modify operation of the barrier at the Head of Old River to minimize the potential for drawing splittail toward the south Delta pumping plants.	
14. To the extent consistent with Program objectives, design and construct overflow basins from existing leveed lands in stages using construction design and operating schemes and procedures developed through pilot studies and project experience to minimize the potential for stranding as waters recede from overflow areas.	
15. Design and construct a new intake screen system at the entrance to Clifton Court Forebay that minimizes potential involvement of splittail and connect intakes of Tracy Pumping Plant to Clifton Court Forebay.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
16. Consistent with Program objectives, make modifications to South Delta channels to improve circulation and transport of north of Delta water to the south Delta pumping plants to ensure habitat supports splittail and to not increase transport of splittail to the south Delta pumping plants.	
17. To the extent practicable, design seasonal wetlands that have hydrological connectivity with occupied channels to reduce the likelihood for stranding and to provide the structural conditions necessary for spawning.	
18. To the extent consistent with Program objectives, protect spawning areas by providing suitable water quality (i.e., low concentrations of pollutants) and substrates for egg attachment (e.g., submerged tree roots and branches and emersed and submersed vegetation).	
19. To the extent consistent with Program objectives, protect rearing habitat from physical disturbance (e.g., sand and gravel mining, diking, dredging, and levee or bank protection and maintenance) and flow disruption (e.g., water diversions, in-channel barriers, or tidal gates).	
20. To the extent consistent with Program objectives, maintain low salinity zone in historical occupied habitat areas of the Bay and Delta from February through the summer.	
21. To the extent consistent with Program objectives, provide unrestricted access of adults to spawning habitat from December to July by maintaining adequate flow and water quality, and minimizing disturbance and flow disruption.	
22. Expand IEP monitoring efforts in the south Delta for Sacramento splittail.	
23. To the extent consistent with Program objectives, initiate implementation of the Service’s “Rainbow Report” or similar documentation to provide increased water quality in the south Delta and eliminate or reduce the need for installation of barriers.	
24. Consistent with Program objectives, reduce the effects on splittail from changes in reservoir operations and ramping rates for flood control.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
25. To the extent consistent with Program objectives, reduce the loss of freshwater and low-salinity splittail habitat in the Bay-Delta as a result of reductions in Delta inflow and outflow.	
26. Consistent with Program objectives, increase the frequency of flood bypass flooding in non-wet years to improve splittail spawning and early rearing habitat.	
27. To the extent consistent with Program objectives, ensure that the Yolo and Sutter Bypasses are flooded during the spawning season at least once every 5 years.	
28. Consistent with Program objectives, improve the frequency, duration, and extent of bypass flooding in all years.	
29. Develop a water management plan to allocated multiyear water supply in reservoirs to protect drought year supplies and source of winter-spring Delta inflow and outflow needed to sustain splittail and their habitats.	
<p>Valley Elderberry Longhorn Beetle (<i>Desmocerus californicus dimorphus</i>): Maintain and restore connectivity among riparian habitats occupied by the valley elderberry longhorn beetle and within its historic range along the Sacramento and San Joaquin Rivers and their major tributaries.</p>	
1. Coordinate protection and restoration of riparian habitats with other federal and state programs (e.g., USFWS recovery plans, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of occupied and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.	1. Conduct surveys in suitable habitat areas within the species range that could be affected by Program actions to determine the presence and distribution of the valley elderberry longhorn beetle before implementing actions that could result in the loss or degradation of occupied habitat.
2. Within the species current range, design ERP riparian habitat enhancements and restorations to include suitable riparian edge habitat, including elderberry savanna.	2. Until the valley elderberry longhorn beetle has been recovered, implement the USFWS’s guidelines for mitigating project effects on the valley elderberry longhorn beetle to compensate for Program impacts on the species.
3. Initially direct ERP riparian habitat actions towards enhancement and restoration of habitat areas located near occupied habitat areas to encourage the natural expansion of the species range.	

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>4. Include sufficient buffer habitat around suitable restored and enhanced habitat areas within the species’ range to reduce potential adverse effects associated with pesticide drift.</p> <p>5. To the extent consistent with Levee System Integrity Program objectives, implement levee maintenance guidelines to protect suitable habitat.</p> <p>6. To the extent consistent with Levee System Integrity Program objectives, design levees to encourage the establishment and long-term maintenance of suitable habitat.</p>	
<p>Lange’s metalmark butterfly (<i>Apodemia mormo langei</i>): Continue protection of and expand the size of the Antioch Dunes population of the Lange’s metalmark butterfly; enhance and restore suitable habitat at and in the vicinity of the Antioch Dunes; and achieve recovery goals identified in the USFWS recovery plan.</p>	
<p>1. Coordinate protection and restoration of inland dune scrub habitats with other programs (e.g., USFWS recovery plans and management of the Anitoch Dunes Preserve) that could affect management of occupied and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. Conduct surveys to locate potential habitat restoration sites on Tinnin soils and identify opportunities for and implement permanent protection, restoration, and management of these habitat areas to enhance habitat conditions for the Lange’s metalmark.</p> <p>3. Monitor enhanced and restored habitat areas to determine the success of enhancement and restoration methods, and to determine the response of the Lange’s metalmark populations to management.</p>	<p>1. Avoid implementing any Program actions that potentially could result in harm or mortality to individuals or viability of the species’ populations, or result in the degradation or loss of occupied habitats.</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Soft bird’s-beak (<i>Cordylanthus mollis ssp. mollis</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of soft bird’s-beak and reestablish and maintain viable populations throughout its historic range.</p>	
<ol style="list-style-type: none"> 1. Expand potential habitat by improving tidal circulation to diked wetlands that sustain some existing exchange. 2. Identify opportunities for establishing new populations or expanding existing populations and habitat. 3. Establish soft bird’s-beak populations to existing and restored suitable habitat. 4. Control and reduce populations of non-native marsh species with potential effects on soft bird’s-beak and potential soft bird’s-beak habitat. 5. Monitor the population size and vigor of all extant occurrences at a two-year interval for the duration of the CALFED program and design and implement remediation measures recovery goal is not met. 6. Modify conservation measures according to the adaptive management process as more understanding is developed of recovery needs. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat. 2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.
<p>Suisun thistle (<i>Cirsium hydrophilum var. hydrophilum</i>): Protect and maintain all extant occurrences, establish 10 new populations and increase overall population size ten-fold.</p>	
<ol style="list-style-type: none"> 1. Identify opportunities for establishing new populations or expanding existing populations and habitat. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>2. Control and reduce populations of non-native marsh species with potential effects on Suisun thistle and potential Suisun thistle habitat.</p> <p>3. Monitor the population size and vigor of all extant occurrences at a two-year interval.</p> <p>4. Modify conservation measures according to the adaptive management process as more understanding is developed of recovery needs.</p>	<p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>
<p>Antioch Dunes evening-primrose (<i>Oenothera deltoides</i> ssp. <i>howellii</i>) and Contra Costa wallflower (<i>Erysimum capitatum</i> ssp. <i>angustatum</i>): Continue protection of and expand the size of these species Antioch Dunes populations; enhance and restore suitable habitat at and in the vicinity of the Antioch Dunes; and achieve recovery goals identified in the USFWS recovery plan. Achieve recovery goals identified in the USFWS recovery plan.</p>	
<p>1. Coordinate protection and restoration of inland dune scrub habitats with other programs (e.g., USFWS recovery plans and management of the Anitoch Dunes Preserve) that could affect management of occupied and historic habitat areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. Conduct surveys to locate potential habitat restoration sites on Tinnin soils and identify opportunities for and implement permanent protection, restoration, and management of these habitat areas to enhance habitat conditions for these species.</p> <p>3. Enhance and maintain existing occurrences.</p> <p>4. Annually monitor establishment success and modify establishment and management techniques as needed using adaptive management.</p>	<p>1. Avoid implementing any Program actions that potentially could result in harm or mortality to individuals or viability of the species' populations, or result in the degradation or loss of occupied habitats.</p>

Table A: Prescriptions and Conservation Measures for Species with “R” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Mason’s lilaepsis (<i>Lilaeopsis masonii</i>) and Suisun Marsh aster (<i>Aster lentus</i>): Expand suitable habitat by 100 linear miles and protect at least 90% of the currently occupied habitat including 90% of high quality habitat, including occurrences in the North , South and East Delta and Napa River Ecological Management Units.</p>	
<ol style="list-style-type: none"> 1. Maintain processes that support the dynamic habitat distributed throughout the species range and associated with existing source populations (species occurs on eroding margins of levees). 2. To the extent practicable, design restoration of tidal habitats to create unvegetated, exposed substrate habitat at tidal margins of tidal fresh emergent wetland and riparian habitat. 3. To the extent consistent with Program objectives, incorporate sufficient edge habitat to support the species in levee set back and channel island habitat restoration designs. 4. To the extent practicable, maximize sinuosity of restored and created slough channels to increase water-land edge habitat. 5. To the extent consistent with Program objectives, maintain and restore habitat and populations throughout the species’ geographic ranges and expand habitat and populations to their historical and ecological ranges based on hydrologic, salinity and other habitat requirements of the species. 6. Consistent with Program objectives, incorporate suitable habitat for these species in bank protection designs used in CALFED actions. 7. Monitor status and distribution of the species at five-year intervals. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat. 2. For each linear foot of occupied habitat lost, create 5-10 linear feet, depending on habitat quality, of potential habitat within one year of loss.



Table B: Prescriptions and Conservation Measures for Species with “r” Goals

MSCS User Guide: This table presents prescriptions and conservation measures for evaluated species with a “r” goal (species prescriptions follow the name of the species). Conservation measures to avoid, minimize, or compensate for potential adverse impacts on species may be less appropriate or more appropriate than others for addressing a specific type or level of impact on an species. Conservation measures that add detail to Program actions would achieve prescriptions (i.e., species habitat or population targets that, if met, achieve species goals) for species with a “r” goal when implemented in combination with conservation measures to avoid, minimize, and compensate for Program impacts. These conservation measures represent the range of actions that may be required to ensure that prescriptions for species with a “r” goal are achieved.. The need to implement a particular conservation measure for achieving “r” goals will depend on the response of “r” species populations to ERP and other Program actions as they are implemented.

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Riparian brush rabbit (<i>Sylvilagus bachmani riparius</i>): Protect the Caswell Memorial State Park population; protect, enhance, and expand the species’ Caswell Memorial State Park population; and restore four additional self-sustaining populations in the Delta and along the San Joaquin River by 2020.</p>	
<ol style="list-style-type: none"> 1. Coordinate protection, enhancement, and restoration of riparian brush rabbit populations and its habitat with other federal and state programs (e.g., USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives. 2. Conduct surveys to identify suitable habitat areas for establishment of additional populations in the Delta and along the San Joaquin River and implement introductions to establish four additional populations in these areas by 2020. 3. Direct ERP actions proposed for the Stanislaus River towards protecting, enhancing, and restoring suitable riparian and associated flood refuge habitats in and adjacent to occupied habitat at Caswell Memorial State Park. 4. Develop and implement a monitoring plan to assess population status and trends. 	<ol style="list-style-type: none"> 1. Avoid implementing any Program actions that potentially could result in harm or mortality to individuals or viability of the species’ population, or result in the degradation or loss of occupied habitat.

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>San Joaquin Valley woodrat (<i>Neotoma fuscipes riparia</i>): Protect the Caswell Memorial State Park population; protect, enhance, and expand the species’ Caswell Memorial State Park population; and improve habitat connectivity and genetic interchange among isolated populations.</p>	
<p>1. Coordinate protection, enhancement, and restoration of San Joaquin Valley woodrat populations and its habitat with other federal and state programs (e.g., USFWS species recovery plans and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. Direct ERP actions proposed for the Stanislaus River towards protecting, enhancing, and restoring suitable riparian and associated flood refuge habitats in and adjacent to occupied habitat at Caswell Memorial State Park.</p> <p>3. Direct ERP actions proposed for the San Joaquin River and it’s major tributaries within the current range of the species towards protecting and enhancing existing occupied habitat areas; restoring suitable habitat adjacent to occupied habitat areas; and restoring suitable riparian habitat to create habitat corridors linking isolated populations.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p> <p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied habitat areas.</p> <p>3. Avoid implementing Program actions that could result in mortality of the species.</p> <p>4. Replace potentially occupied habitat that would be permanently lost or degraded by Program actions at ratio of 2-5 acres of restored habitat for every acre of affected habitat.</p>
<p>Salt marsh harvest mouse (<i>Reithrodontomys raviventris</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the salt marsh harvest mouse and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area.</p>	
<p>1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the salt marsh harvest mouse should be: 1) western Suisun Marsh, 2) Gallinas/Ignacio Marshes, Napa Marshes, and eastern Suisun Marsh, 3) Sonoma Marshes, Petaluma Marshes, and Highway 37 marshes west of Sonoma creek, 4) Point Pinole Marshes, 5) Highway 37 marshes east of Sonoma Creek, and 6) the Contra Costa County Shoreline.</p>	<p>1. Conduct surveys to determine the presence and distribution of salt marsh harvest mice in suitable habitat before implementing Program actions that could result in the loss or degradation of habitat.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied habitat areas.</p>
<p>3. Restore wetland and perennial grassland habitats adjacent to occupied habitats to create a buffer of natural habitat to protect populations from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide habitat suitable for the natural expansion of populations.</p>	<p>3. Provide interim management of occupied salt marshes to maintain source populations until restored habitats have developed sufficiently to provide suitable habitat.</p>
<p>4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat.</p>	<p>4. Minimize the adverse effects of the artificial stabilization of salinity ranges.</p>
<p>5. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.</p>	<p>5. To the extent practicable, avoid restoring tidal action to diked marshes that are occupied by Salt marsh harvest mice until restoration of at least twice as much tidal, high marsh, and wetland to upland transition habitat as would be affected by restoration of tidal exchange has been initiated in the western Suisun marsh. In addition, an equal amount of occupied habitat in the eastern Suisun Marsh as would be affected by restoration of occupied habitat will be maintained as managed marsh to provide suitable species habitat area until newly restored habitat in the western Suisun marsh has developed sufficiently to provide suitable salt marsh harvest mouse habitat.</p>
<p>6. To the extent practicable, direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).</p>	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
7. Consistent with Program objectives, design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.	
8. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the salt marsh harvest mouse.	
9. Direct restoration efforts towards restoration of lands adjacent to occupied habitat areas.	
10. Direct restoration efforts towards improving tidal circulation to diked wetlands that currently sustain partial tidal exchange.	
11. Direct some habitat enhancements and restorations towards increasing habitat connectivity among existing and restored tidal marshes.	
12. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.	
13. Control non-native invasive plants in existing salt marshes where non-native plants have degraded habitat quality and in salt marshes restored under the ERP.	
14. Monitor the use of restored salt marsh habitats by salt marsh harvest mice and the rate at which restored habitats are colonized.	
15. Acquire conservation easements to adjust grazing regimes to enhance wetland to upland transition habitat conditions.	
16. Consistent with Program objectives, manage lands purchased or acquired under conservation easements that are occupied by the species to maintain or increase their current population levels.	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>San Pablo California vole (<i>Microtus californicus sanpabloensis</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the San Pablo California vole and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area and the Delta Region.</p>	
<ol style="list-style-type: none">1. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.2. Consistent with Program objectives, restore wetland and perennial grassland habitats adjacent to occupied habitats to create a buffer of natural habitat to protect populations from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide habitat suitable for the natural expansion of populations.3. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the San Pablo California vole.4. To the extent practicable, acquire, restore, and manage historic tidal salt marshes and surrounding lands occupied by the San Pablo California vole along the west side of Point Pinole to tidal marsh with sufficient wetland to upland transition and adjacent upland habitat to improve habitat conditions for the San Pablo California vole.5. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.6. Identify and implement feasible methods for controlling invasive non-native marsh plants.7. Consistent with Program objectives, manage lands purchased or acquired under conservation easements that are occupied by the species to maintain or increase their current population levels.	<ol style="list-style-type: none">1. Conduct surveys to determine the presence and distribution of San Pablo California voles in suitable habitat before implementing Program actions that could result in the loss or degradation of habitat.2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied habitat areas.

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Bank swallow (<i>Riparia riparia</i>): Allow reaches of the Sacramento River and its tributaries that are unconfined by flood control structures (i.e., bank revetment and levees) continue to meander freely, thereby creating suitable bank nesting substrates through the process of bank erosion.</p>	
<ol style="list-style-type: none"> 1. Coordinate protection and restoration of channel meander belts and existing colonies with other federal and state programs (e.g., the SB1086 program and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives. 2. Proposed ERP actions designed to protect or restore stream meander belts should initially be implemented along reaches of the Sacramento River and its tributaries that support nesting colonies or potential nesting habitat. 3. Monitor to determine the response of bank swallows to restoration of stream meander belts and riparian habitat. 4. Coordinate with BOR and DWR to phase spring-summer reservoir releases in a manner that would reduce the potential for adverse effects on nesting colonies that could result from large, pulsed, releases. 5. Consistent with Program objectives, protect all known nesting colonies from potential future changes in land use or activities that could adversely affect colonies. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat. 2. To the extent practicable, avoid implementing actions that could adversely affect known colonies or unoccupied river reaches with eroding banks composed of soils that would provide suitable nesting substrate. 3. Avoid implementing actions near active colonies from April-August. 4. To the extent practicable, avoid implementing actions that would create suitable, but temporary, nesting habitat that could create population sinks by attracting bank swallows or implement additional actions to render such habitat areas unattractive to bank swallows.
<p>California yellow warbler (<i>Dendroica petechia brewsteri</i>) and Little willow flycatcher (<i>Empidonax traillii brewsteri</i>): Maintain and enhance suitable riparian corridor migration habitats and restore suitable breeding habitat within the historic breeding range of these species in the Central Valley.</p>	
<ol style="list-style-type: none"> 1. Coordinate protection and restoration of riparian habitat areas with other federal, state, and non-profit programs (e.g., the Riparian Habitat Joint Venture, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives. 	<ol style="list-style-type: none"> 1. Fully mitigate for impacts on existing nesting habitat areas that may be associated with Watershed Program or other CALFED actions.

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>2. Consistent with Program objectives, protect existing suitable riparian habitat corridors from potential future changes in land use or other activities that could result in the loss or degradation of habitat.</p> <p>3. A portion of restored riparian habitat area should be designed to include riparian scrub communities.</p> <p>4. To the extent practicable, restore riparian habitats in patch sizes sufficient to discourage nest parasitism by brown-headed cowbirds.</p>	<p>2. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p>
<p>California clapper rail (<i>Rallus longirostris obsoletus</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the California clapper rail and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area.</p>	
<p>1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the California clapper rail should be: 1) Gallinas/Ignacio marshes and Napa Marshes, 2) Sonoma Marshes, Petaluma Marshes, and Highway 37 marshes west of Sonoma creek, 3) Point Pinole Marshes, 4) Highway 37 marshes east of Sonoma Creek, and 5) the Contra Costa County Shoreline.</p> <p>2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>1. Conduct surveys to determine the presence and distribution of California clapper rails in suitable nesting habitat before implementing Program actions that could result in the loss or degradation of habitat.</p> <p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied nesting habitat areas.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>3. Consistent with Program objectives, restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide suitable foraging habitat and nesting habitat area suitable for the natural expansion of populations.</p>	<p>3. Avoid disturbances that could be associated with implementing Program actions near active nest sites during the nesting period (mid-March - July).</p>
<p>4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat.</p>	
<p>5. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.</p>	
<p>6. Direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).</p>	
<p>7. To the extent practicable, design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.</p>	
<p>8. Consistent with Program objectives, manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the California clapper rail.</p>	
<p>9. Direct ERP restoration actions towards improving tidal circulation to diked wetlands that currently sustain partial tidal exchange.</p>	
<p>10. Direct some habitat enhancements and restorations towards increasing habitat connectivity among existing and restored tidal marshes.</p>	
<p>11. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.</p>	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
12. Identify and implement feasible methods for controlling invasive non-native marsh plants.	
13. Monitor to determine use of restored salt marsh habitat by California clapper rails and the rate at which restored habitats are colonized.	
<p>California black rail (<i>Laterallus jamaicensis coturniculus</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the California black rail and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area and the Delta Region.</p>	
<p>1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the California black rail within the Bay Region should be: 1) western Suisun Marsh, 2) Gallinas/Ignacio marshes, Napa Marshes, and eastern Suisun Marsh, 3) Sonoma Marshes, Petaluma Marshes, and Highway 37 marshes west of Sonoma creek, 4) Point Pinole Marshes, 5) Highway 37 marshes east of Sonoma Creek, and 6) the Contra Costa County Shoreline.</p>	<p>1. Conduct surveys to determine the presence and distribution of California black rails in suitable nesting habitat before implementing Program actions that could result in the loss or degradation of habitat.</p>
<p>2. Coordinate protection, enhancement, and restoration of salt and freshwater marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied nesting habitat areas.</p>
<p>3. Consistent with Program objectives, restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide suitable foraging habitat and nesting habitat area suitable for the natural expansion of populations.</p>	<p>3. Avoid disturbances that could be associated with implementing Program actions near active nest sites during the nesting period (mid-March - July).</p>
<p>4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat.</p>	<p>4. Minimize the adverse effects of the artificial stabilization of salinity ranges.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
5. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat.	5. Consistent with Program objectives, avoid restoring tidal action to diked marshes that are occupied by California black rails until restoration of at least twice as much tidal, high marsh, and wetland to upland transition habitat as would be affected by restoration of tidal exchange has been initiated in the western Suisun marsh. In addition, an equal amount of occupied habitat in the eastern Suisun Marsh as would be affected by restoration of occupied habitat will be maintained as managed marsh to provide suitable species habitat area until newly restored habitat in the western Suisun marsh has developed sufficiently to provide suitable California black rail habitat.
6. Direct ERP salt and freshwater marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size).	
7. To the extent practicable, design salt and freshwater marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.	
8. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the California black rail.	
9. Direct ERP habitat restorations towards improving tidal circulation to diked wetlands that currently sustain partial tidal exchange.	
10. Direct some habitat enhancements and restorations towards increasing habitat connectivity among existing and restored tidal marshes.	
11. To the extent practicable, control non-native predator populations in occupied habitat areas and salt and freshwater marshes enhanced and restored under the ERP.	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
12. Identify and implement feasible methods for controlling invasive non-native marsh plants.	
13. Monitor to determine use of restored salt and freshwater marsh habitats by California black rails and the rate at which restored habitats are colonized.	
14. Acquire conservation easements in occupied habitat areas to adjust grazing regimes to enhance wetland to upland transition habitat conditions.	
<p>Greater sandhill crane (<i>Grus canadensis tabida</i>): Achieve recovery objectives identified in the Pacific Flyway Management Plan for the Central Valley population of greater sandhill cranes and AB1280 legislation that are applicable to the CALFED problem area, the Butte Sink, and other species’ use areas consistent with CALFED’s mission.</p>	
1. Consistent with Program objectives, implement ERP actions in concert with the species recovery strategies identified in AB1280 and the Pacific Flyway Plan.	1. To the extent practicable, avoid implementing actions near known wintering areas centered around Bract Tract (Staten Island, Taylor, Bouldin Island, Canal Ranch, and area east around Cosumnes River) and in the Butte Sink (from Chico in the north to the Sutter Buttes and from Sacramento River to the west to Highway 99) that could adversely affect foraging and roosting habitat and protect these habitat areas from potential future changes in land use or other activities that could result in the loss or degradation of habitat.
2. Implementation of proposed ERP actions to enhance agricultural habitats should give priority to improving the abundance and availability of upland agricultural forage (e.g., corn and winter wheat) in the core use area centered around Bract Tract.	2. Restore functional habitat use areas (i.e. habitat is used traditionally and consistently for at least 5 years) before any habitat use areas in core area centered on Bract Tract are converted to unsuitable habitat or is degraded as a result of implementing Program actions.
3. Implementation of proposed ERP actions to restore wetlands should give priority to restoring and managing wetland habitat area within the core use area centered on Bract Tract that would provide suitable roosting habitat.	3. To the extent practicable, implement ERP restoration of suitable crane habitats (i.e., seasonal wetlands, grasslands, upland croplands, and seasonally flooded agriculture) concurrent with ERP actions that would convert suitable existing habitat to unsuitable habitat (e.g., tidal habitats).
4. Minimize or avoid recreational uses in the core area centered on Bract Tract that could disrupt crane habitat use patterns from October-March.	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
5. Consistent with Program objectives, at least 10% of agricultural lands to be enhanced under the ERP in the Delta and the Butte Sink should be to increase forage abundance and availability for cranes. Priority should be given to implementing these habitat improvements within 10 miles of core habitat area centered on Bract Tract.	
6. Monitor to determine use of protected, restored, and enhanced habitats by sandhill cranes in core wintering areas.	
Least Bell's vireo (<i>Vireo bellii pusillus</i>): Achieve recovery objectives identified in the least Bell's vireo recovery plan (USFWS 1998) applicable to the ERP focus study area.	
1. Coordinate protection and restoration of riparian habitat areas with other federal, state, and non-profit programs (e.g., the least Bell's vireo recovery plan team, Riparian Habitat Joint Venture, and the Corps' Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.	
2. Protect existing riparian habitat areas from potential future changes in land use or other activities that could result in the loss or degradation of habitat areas that would be suitable for reintroductions or natural colonization of the species.	
3. A portion of restored riparian habitat area should be designed to include riparian scrub communities.	
4. Restore riparian habitats in patch sizes sufficient to discourage nest parasitism by brown-headed cowbirds.	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Saltmarsh common yellowthroat (<i>Geothlypis trichas sinuosa</i>): Reduce the risk of current and imminent threats to maintaining the current distribution and existing populations of the saltmarsh common yellowthroat and reestablish and maintain viable species’ populations throughout its historic range in the portion of the Bay Region within the ERP focus area.</p>	
<ol style="list-style-type: none"> 1. The geographic priorities for implementing ERP actions to protect, enhance, and restore saline emergent wetlands and associated habitats for the saltmarsh common yellowthroat should be: 1) Gallinas/Ignacio marshes and Napa Marshes, 2) Sonoma Marshes, Petaluma Marshes, and Highway 37 marshes west of Sonoma creek, 3) Point Pinole Marshes, 4) Highway 37 marshes east of Sonoma Creek, and 5) the Contra Costa County Shoreline. 2. Coordinate protection, enhancement, and restoration of salt marsh and associated habitats with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project and USFWS species recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives. 3. Consistent with Program objectives, restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide suitable foraging habitat and nesting habitat area suitable for the natural expansion of populations. 4. Initial species recovery efforts should be directed to locations where there are immediate opportunities for protection, enhancement, or restoration of suitable habitat. 5. To the extent practicable, design dikes constructed in enhanced and restored saline emergent wetlands to provide optimal wetland to upland transitional habitat. 6. Direct ERP salt marsh enhancement efforts towards existing degraded marshes that are of sufficient size and configuration that are large enough to develop fourth order tidal channels (marshes would likely need to be at least 1,000 acres in size). 	<ol style="list-style-type: none"> 1. Conduct surveys to determine the presence and distribution of Saltmarsh common yellowthroats in suitable nesting habitat before implementing Program actions that could result in the loss or degradation of habitat. 2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied nesting habitat areas. 3. To the extent practicable, avoid disturbances that could be associated with implementing Program actions near active nest sites during the nesting period (mid-March - July).

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>7. To the extent practicable, design salt marsh enhancements and restorations to provide low-angle upland slopes at the upper edge of marshes to provide for the establishment of suitable and sufficient wetland to upland transition habitat. To the extent feasible, transition habitat zones should be at least 0.25 mile in width.</p> <p>8. Manage enhanced and restored habitat areas to avoid or minimize potential impacts associated with recreational uses on lands acquired or managed under conservation easements on the Saltmarsh common yellowthroat.</p> <p>9. Direct ERP restorations towards improving tidal circulation to diked wetlands that currently sustain partial tidal exchange.</p> <p>10. Direct some habitat enhancements and restorations towards increasing habitat connectivity among existing and restored tidal marshes.</p> <p>11. To the extent practicable, control non-native predator populations in occupied habitat areas and salt marshes enhanced and restored under the ERP.</p> <p>12. Identify and implement feasible methods for controlling invasive non-native marsh plants.</p> <p>13. Monitor to determine use of restored salt marsh habitat by Saltmarsh common yellowthroats and the rate at which restored habitats are colonized.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p>
<p>Swainson’s hawk (<i>Buteo swainsoni</i>): Protect, enhance, and increase habitat sufficient to support a viable breeding population. The interim prescription is to increase the current estimated population of 1,000 breeding pairs in the Central Valley to 2,000 breeding pairs. This prescription will be modified based on results of a population viability analysis being conducted by DFG.</p>	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>2. To the extent practicable, design restored seasonal wetlands in occupied habitat areas to provide overwinter refuge for rodents to provide source prey populations during spring and summer.</p> <p>3. Implementation of proposed ERP actions to enhance agricultural habitats should give priority to improving the abundance and availability of upland agricultural forage (e.g., corn and winter wheat) in the core use area centered around Bract Tract.</p> <p>4. Consistent with Program objectives, enhance at least 10% of agricultural lands to be enhanced under the ERP in the Delta, Sacramento River, and San Joaquin River Regions to increase forage abundance and availability within 10 miles of occupied habitat areas.</p> <p>5. Consistent with Program objectives, manage lands purchased or acquired under conservation easements that are occupied by the species to maintain or increase their current population levels.</p> <p>6. To the extent practicable, manage restored or enhanced habitats under the ERP to maintain desirable rodent populations and minimize potential impacts associated with rodent control.</p>	<p>2. Consistent with Program objectives, avoid implementing actions near locations that support high densities of nesting pairs that could adversely affect high value foraging and nesting habitat.</p> <p>3. Consistent with Program objectives, avoid implementing actions within 5 miles of active nest sites that could result in disturbance during the breeding period (April-September).</p> <p>4. Consistent with Program objectives, adhere to DFG Region II mitigation guidelines for avoiding or minimizing potential impacts of implementing actions on the Swainson’s hawk.</p> <p>5. To the extent practicable, implement ERP restoration or enhancement of suitable Swainson’s hawk habitats (i.e., riparian forest and woodland, grassland, and upland croplands) concurrent with ERP actions that would convert suitable existing habitat to unsuitable habitat (e.g., tidal habitats).</p>
<p>Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>): Protect existing suitable riparian forest habitat areas within the species’ historic range and increase the area of suitable riparian forest habitat sufficiently to allow the natural expansion of the Sacramento Valley population.</p>	
<p>1. Coordinate protection and restoration of riparian habitat areas with other federal, state, and non-profit programs (e.g., the Riparian Habitat Joint Venture, the SB1086 program, and the Corps’ Sacramento and San Joaquin Basin Comprehensive Study) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p> <p>2. Initially restore suitable valley/foothill riparian forest and woodland under the ERP along at least 10 contiguous miles of channels in the Delta to create a riparian forest corridor at least 200 meters in width.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p> <p>2. Consistent with Program objectives, avoid implementing actions that could degrade or result in the loss of suitable nesting habitat within the species current and historic range.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>3. Restore large contiguous blocks of suitable valley/foothill riparian forest and woodland at least 200 meters in width and 500 acres in size along reaches of the Sacramento River adjacent to occupied habitat areas (Red Bluff to Colusa).</p>	<p>3. Avoid implementing actions near active nest sites that could result in disturbance during the breeding period (May - August).</p>
<p>Sacramento perch (<i>Archoplites interruptus</i>): Establish multiple self-sustaining populations of Sacramento perch within the Central Valley.</p>	
<p>1. Coordinate protection, enhancement, and restoration of the Sacramento perch and its habitats with other federal, state, and regional programs (e.g., USFWS recovery plans) that could affect management of current and historic habitat use areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	
<p>2. Implement reintroductions into suitable habitat areas and manage habitat areas to maintain introduced populations.</p>	
<p>Giant garter snake (<i>Thamnophis gigas</i>): Protect the existing population and habitat within the Delta Region and restore, enhance, and manage suitable habitat areas adjacent to known populations to encourage the natural expansion of the species.</p>	
<p>1. A substantial portion of tidal wetlands to be restored under the ERP should be restored in the North Delta (the Yolo Basin and Bypass).</p>	<p>1. Conduct surveys to determine the occupancy and distribution of the species within suitable habitat areas that could be affected by Program actions.</p>
<p>2. Consistent with Program objectives, protect existing and restore additional habitat in the east Delta to create a corridor of suitable habitat linking Stone Lakes, the Cosumnes River, and White Slough.</p>	<p>2. Replace potentially occupied habitat that would be permanently lost or degraded by Program actions at ratio of 2-3 acres of restored habitat for every acre of affected habitat.</p>
<p>3. To the extent practicable, design setback levees in the restored Stone Lakes/Cosumnes River/White Slough habitat corridor to include a mosaic of habitats.</p>	<p>3. Restore potentially occupied habitat that would be temporarily degraded by Program actions onsite immediately following project completion.</p>
<p>4. Identify opportunities for implementing levee maintenance practices in the Delta that will maintain suitable levee habitat or minimize the impacts of necessary maintenance on the species and its habitat.</p>	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>5. Incorporate restoration of permanent or seasonal flooded (April-October) suitable habitat areas as part of a mosaic of the seasonal wetland and agricultural land enhancements to be implemented under the ERP.</p>	
<p>6. Consistent with Program objectives, locate ERP nontidal marsh restorations near existing occupied habitat areas and design restorations to include suitable upland habitat area at least 200' around restored wetlands.</p>	
<p>7. Consistent with Program objectives, design levees to be upgraded for flood protection or conveyance to incorporate restoration of suitable wetland and upland habitats for the giant garter snake..</p>	
<p>8. Include improvements to and maintenance of suitable agricultural infrastructure habitat (i.e. ditches, drains, canals, and levees) as part of ERP actions to improve wildlife habitat values associated with agricultural lands.</p>	
<p>9. Consistent with Program objectives, manage lands purchased or acquired under conservation easements that are occupied by the species to maintain or increase their current population levels.</p>	
<p>10. Monitor suitable wetlands restored in the Delta Region adjacent to or near occupied habitats to assess if and when (relative to habitat maturity) giant garter snakes occupy restored habitat or to identify reasons they are not using restored and apparently suitable habitat.</p>	
<p>Delta Green Ground Beetle (<i>Elaphrus viridis</i>): Protect all known occupied habitat areas from potential adverse affects associated current and potential future land uses and establish three additional populations of the delta green ground beetle within its current and/or historic range.</p>	
<p>1. Coordinate protection, enhancement, and restoration of delta green ground beetle populations and its habitat with other federal and state programs (e.g., USFWS species recovery plans and management of the Jepson Prairie Preserve) that could affect management of current and historic habitat areas to avoid potential conflicts among management objectives and identify opportunities for achieving multiple management objectives.</p>	<p>1. Conduct surveys in suitable habitat areas within the species range that could be affected by Program actions to determine the presence and distribution of the delta green ground beetle before implementing actions that could result in the loss or degradation of occupied habitat.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>2. Direct ERP actions towards protecting, enhancing, and restoring suitable vernal pool and associated grassland habitat within the species historic range, including expansion of Jepson Prairie Preserve westward to Travis Air Force Base.</p> <p>3. Consistent with ERP objectives, direct ERP actions towards protection of the Davis Antenna Site population.</p> <p>4. Conduct surveys to identify suitable habitat areas, including enhanced and restored habitats, for establishment of additional populations in the Delta and Bay Regions and implement species introductions to establish three additional populations.</p> <p>5. Consistent with Program objectives, manage lands purchased or acquired under conservation easements that are occupied by the species to maintain or increase current population levels and enhance occupied habitat areas.</p>	<p>2. Consistent with Program objectives, avoid implementing Program actions that could result in the degradation or loss of occupied habitat areas.</p> <p>3. Replace potentially occupied habitat that would be permanently lost or degraded by Program actions at ratio of 2-5 acres of restored habitat for every acre of affected habitat.</p>
<p>Northern California Black Walnut (<i>Juglans californica</i> var. <i>hindsii</i>) (native stands): Protect and maintain the remaining stands, and establish 5-10 naturally regenerating black walnut stands within its historic range.</p>	
<p>1. Protect, manage, and maintain existing native stands in conjunction with restoration of riparian habitats.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p> <p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Bristly sedge (<i>Carex comosa</i>): Research habitat requirements and use knowledge gained to develop and implement specific recovery measures</p>	
<p>1. Identify and implement opportunities to restore suitable wetland habitat within ERP nontidal freshwater marsh restoration actions.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p> <p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>
<p>Point Reyes bird’s-beak (<i>Cordylathus maritimus ssp. palustris</i>): Maintain, enhance and restore suitable high marsh and high marsh-upland transition habitat around San Pablo Bay.</p>	
<p>1. Consistent with Program objectives, identify and implement restoration of suitable habitat in high marsh and marsh/upland transition areas. Incorporate high marsh and margin suitable habitat in ERP salt marsh restoration actions.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p>
<p>2. Maintain, enhance and restore Point Reyes bird’s-beak habitat around San Pablo Bay in conjunction with restoration of saline emergent wetlands..</p>	<p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>
<p>3. Prepare and implement a management plan to control and reduce non-native weeds near existing and new populations.</p>	

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>Crampton’s tuctoria (<i>Tuctoria mucronata</i>): Review and update recovery plan targets, protect all extant occurrences, and manage habitat to benefit Crampton’s tuctoria (e.g., manage grazing).</p>	
<ol style="list-style-type: none"> 1. Establish three new self-sustaining populations in conjunction with establishment of Delta green ground beetle populations. 2. Maintain existing populations. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat. 2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.
<p>Delta mudwort (<i>Limosella subulata</i>) and Delta tule pea (<i>Lathyrus jepsonii</i> var. <i>jepsonii</i>): Protect at least 90% of occupied habitat including 90% of high quality habitat throughout range of species to protect geographic diversity; expand suitable habitat by 100 linear miles.</p>	
<ol style="list-style-type: none"> 1. Maintain processes that support the dynamic habitat of Delta mudwort and Delta tule pea throughout the species range and associated with existing source populations. 2. Consistent with Program objectives, create unvegetated, exposed substrate at tidal margins of restored and created tidal fresh emergent wetland and riparian habitat. 3. Consistent with Program objectives, incorporate suitable habitat for these species into levee designs. 4. Incorporate sufficient edge habitat to support the species in levee set back and channel island habitat restoration designs. 5. Maximize sinuosity of restored and created slough channels to increase water-land edge habitat. 	<ol style="list-style-type: none"> 1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat. 2. For each linear foot of occupied habitat lost, create 5-10 linear feet of suitable habitat, of equal or higher habitat quality, within one year of loss.

Table B: Prescriptions and Conservation Measures for Species with “r” Goals (continued)

Conservation Measures that Add Detail to CALFED Program Actions	Conservation Measures to Avoid, Minimize, or Compensate for Potential Adverse Affects
<p>3. Maintain and restore habitat and populations throughout the species geographic ranges and expand the species ranges to the historical and ecological ranges based on hydrological, salinity and other habitat attributes.</p> <p>4. Monitor existing populations and their habitat at five year intervals.</p>	
<p>Delta coyote-thistle (<i>Eryngium racemosum</i>): Protect and maintain the 2 known existing populations and establish 2 additional self-sustaining occurrences.</p>	
<p>1. Restore and protect suitable open floodplain habitat along the San Joaquin River.</p> <p>2. Monitor the status and distribution of populations at two-year intervals and evaluate the need for active reintroduction, and reintroduce the species to restored protected habitat when no natural colonization occurs.</p> <p>3. Protect and manage essential populations of Delta coyote thistle within restored stream meander corridors and riparian habitats.</p>	<p>1. Prior to implementation of CALFED floodplain actions, suitable habitat within the historic range of the species should be surveyed for unknown populations.</p> <p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>
<p>Alkali milkvetch (<i>Astragalus tener</i> var. <i>tener</i>): Protect extant populations in each vernal pool region, throughout the range of habitat conditions and genetic variability, and reintroduce species near extirpated populations.</p>	
<p>1. Protect extant populations in each vernal pool region, throughout the range of habitat conditions and genetic variability, and reintroduce species near extirpated populations.</p> <p>2. Monitor status and distribution of populations and design and implement conservation measures if a decline in population size or vigor is observed.</p>	<p>1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by Program actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.</p> <p>2. To the extent practicable, avoid implementing Program actions that could result in mortality or the loss or degradation of habitat occupied by the species.</p>



Table C: Conservation Measures for Species with “m” Management Goals

MSCS User Guide: This table presents the prescription and conservation measures for evaluated species with a “m” goal. Conservation measures are to avoid, minimize, or compensate for potential adverse impacts on species. Some conservation measures may be less appropriate or more appropriate than others for addressing a specific type or level of impact on an species.

Prescription for “m” Goal Species: An increase in or no discernable adverse effect on the size or distribution of species populations.

General Conservation Measures (Applicable to All “m” Goal Species)

1. Conduct surveys in suitable habitat areas within portions of the species’ range that could be affected by CALFED actions to determine the presence and distribution of the species before implementing actions that could result in take or the loss or degradation of occupied habitat.
2. To the extent practicable, avoid implementing CALFED actions that could result in take of evaluated species or the loss or degradation of habitat occupied by evaluated species.
3. Coordinate CALFED actions with USFWS, NMFS, and/or DFG to avoid potential conflicts with existing and potential future CALFED actions that may be implemented to recover evaluated species.
4. Coordinate CALFED actions with other federal, state, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration CALFED, the SB1086 program, the Corps’ Sacramento and San Joaquin Basin Comprehensive Study, the Riparian Habitat Joint Venture, the Central Valley Habitat Joint Venture, and the Grassland Bird Conservation Plan) that could affect management of evaluated species to avoid potential conflicts among management objectives.
5. Avoid implementing CALFED actions that could result in the substantial loss or degradation of suitable habitat in areas that support core populations of evaluated species and that are essential to maintaining the viability and distribution of evaluated species.
6. CALFED actions that potentially could mobilize large quantities of toxic materials from the soil should include an analysis to determine the amount of contaminants that could be mobilized and, if released contaminant loadings could be harmful to evaluated species, modify actions to the extent practicable to reduce loadings of mobilized contaminants.
7. To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements to maintain or increase current population levels of resident evaluated species.

Species-Specific Conservation Measures

Greater western mastiff-bat (*Eumops perotis californicus*)

1. Conduct surveys in suitable habitat areas within the range of the species that could be affected by CALFED actions to locate traditional greater western mastiff-bat roosts before implementing actions that could result in the loss or degradation of roost habitat.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

2. Avoid implementing CALFED actions that could result in the substantial loss or degradation of roosts that support core species populations that are essential to maintaining the viability and distribution of the species.

3. To the extent consistent with CALFED objectives, manage lands purchased or acquired under conservation easements and that support roost sites to protect roost sites from both disturbances that could cause their abandonment and management actions that could result in loss or degradation of roosting structures.

Giant kangaroo rat (*Dipodomys ingens*), Merced kangaroo rat (*Dipodomys heermanni dixonii*), and Nelson’s antelope ground squirrel (*Ammospermophilus nelsoni*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 1-3 acres of existing occupied habitat areas for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 1-3 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. To the extent practicable, capture individuals from occupied habitat areas that would be affected by CALFED actions and relocate them to nearby suitable existing, restored, or enhanced habitat areas.

Ringtail (*Bassariscus astutus*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage existing occupied habitat areas for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 2-5 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. To the extent consistent with ERP objectives, restore valley/foothill riparian and woodland habitats adjacent to occupied habitats to create a buffer of natural habitat to protect populations from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide suitable habitat for the natural expansion of populations.

California wolverine (*Gulo gulo luteus*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 1-3 acres of existing occupied habitat areas for every acre of within the same area as occupied habitat affected by CALFED actions or B) enhance or restore 1-3 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED.

San Joaquin kit fox (*Vulpes macrotis mutica*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 1-3 acres of existing occupied habitat areas for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 1-3 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. Comply with standardized USFWS guidelines when implementing CALFED actions within potentially occupied habitat (USFWS 1997).

Table C: Conservation Measures for Species with “m” Management Goals (continued)

Aleutian Canada goose (*Branta canadensis leucopareia*)

1. Enhance or restore 1-2 acres of suitable natural or agricultural habitat near affected areas to replace every acre of traditional wintering habitat that is permanently lost or degraded as a result of implementing CALFED actions.
2. To the extent consistent with ERP objectives, direct proposed actions for improving agricultural habitats for wildlife to protecting and improving traditional wintering habitat use areas.

American peregrine falcon (*Falco peregrinus anatum*)

1. Avoid disturbances associated with implementing CALFED actions to active nest sites, including artificial nesting structures (e.g., bridges), during the nesting period (March-August).

Bald eagle (*Haliaeetus leucocephalus*)

1. To the extent practicable, avoid construction- and recreation-related disturbances that could be associated with implementing CALFED actions up to within 0.5 mile of active nest sites during the nesting period (February-July).
2. Avoid implementing CALFED actions that could result in the loss of traditional nesting trees or degradation of natural habitat area up to within 0.5 mile of traditional nest trees.
3. To the extent consistent with CALFED objectives, design and manage new storage reservoirs to optimize nesting habitat suitability.

Black tern (*Chlidonias niger*)

1. Conduct surveys in suitable nesting habitat within portions of the species' breeding range that could be affected by CALFED actions to locate nesting colonies before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.
2. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the degradation or loss of traditional nesting habitat areas.
3. Restore or enhance 1-2 acres of suitable nesting emergent wetland habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat.
4. To the extent consistent with ERP objectives, design and manage wetland habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

5. To the extent consistent with ERP objectives, restore wetland habitats adjacent to nesting colonies to create a buffer of natural tern habitat to protect colonies from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide suitable foraging and nesting habitat areas for the natural expansion of populations.

6. To the extent practicable, avoid disturbances to nesting colonies that could be associated with implementing CALFED actions up to within 0.25 mile of active nesting colonies during the nesting period (May-August).

Black-crowned night heron (rookery) (*Nycticorax nycticorax*), snowy egret (rookery) (*Egretta thula*), great egret (rookery) (*Casmerodius albus*), great blue heron (rookery) (*Ardea herodias*), and White-faced ibis (*Plegadis chihi*)

1. Conduct surveys in suitable nesting habitat within portions of the species’ breeding range that could be affected by CALFED actions to locate nesting colonies before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.

2. To the extent practicable, avoid disturbances to nesting colonies that could be associated with implementing CALFED actions up to within 0.25 mile of active nesting colonies during the nesting period (February-August).

3. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the degradation or loss of traditional nesting habitat areas.

4. Restore or enhance 1-5 acres of suitable valley/ foothill riparian or emergent wetland nesting habitat area near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.

5. To the extent consistent with ERP objectives, design and manage valley/foothill riparian, wetland, and agricultural habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.

6. To the extent consistent with ERP objectives, restore habitats adjacent to nesting colonies to create a buffer of natural habitat to protect colonies from potential adverse affects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.

California condor (*Gymnogyps californianus*) and California brown pelican (*Pelecanus occidentalis californicus*)

1. Avoid implementing CALFED actions that potentially could result in harm or mortality to individuals or viability of the population.

California least tern (*Sterna antillarum browni*)

1. Monitor foraging habitat areas used by terns from the Alameda Colony to ensure proposed changes in Delta outflows that could affect water quality or turbidity do not adversely affect the abundance or availability of prey species.

2. To the extent consistent with CALFED objectives, maintain conservation easements to protect the Pittsburg Colony from adjacent land uses.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

3. To the extent consistent with CALFED objectives, maintain habitat values of ponds used for nesting by the Pittsburg Colony if PG&E’s Pittsburg power plant ceases operation or if PG&E modifies operations in a manner that would degrade the suitability of pond nesting habitat.
4. To the extent consistent with CALFED objectives, protect colonies that may establish elsewhere in the Conservation Strategy focus area as a result of natural expansion of the Delta population from potential future changes in land use or other activities that could adversely affect colonies.

California gull (*Larus californicus*)

1. To the extent practicable, avoid disturbances to nesting colonies that could be associated with implementing CALFED actions up to within 0.25 mile of active nesting colonies during the nesting period (mid-April through mid-August).
2. To the extent practicable, avoid implementing CALFED actions that could adversely affect the nesting success or size of existing breeding colonies.

Cooper’s hawk (*Acciptiter cooperii*)

1. Conduct surveys in suitable nesting habitat within portions of the species’ breeding range that could be affected by CALFED actions to locate active nest sites before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.
2. To the extent practicable, avoid disturbances to nesting pairs that could be associated with implementing CALFED actions up to within 0.25 mile of active nest sites during the nesting period (March-August).
3. To the extent practicable, avoid implementing CALFED actions that could result in the loss of traditional nesting trees.
4. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the substantial loss or degradation of suitable foraging and nesting habitat in areas that support core nesting populations.
5. Restore or enhance 2-5 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
6. To the extent consistent with ERP objectives, restore valley/foothill riparian and woodland habitats adjacent to occupied nesting habitats to create a buffer of natural habitat to protect nesting pairs from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.

Double-crested cormorant (rookery) (*Phalacrocorax auritus*)

1. Conduct surveys in suitable nesting habitat within portions of the species’ breeding range that could be affected by CALFED actions to locate nesting colonies before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

2. To the extent practicable, avoid disturbances to nesting colonies that could be associated with implementing CALFED actions up to within 0.25 mile of active nesting colonies during the nesting period (February-August).
3. To the extent practicable, avoid implementing CALFED actions that could result in the degradation or loss of nesting structures.
4. To the extent consistent with CALFED objectives, manage existing reservoirs that support breeding populations and design and manage new storage reservoirs to provide suitable nesting and foraging habitat conditions.

Golden eagle (*Aquila chrysaetos*)

1. Enhance or restore 1-5 acres of suitable foraging habitat to replace every acre of traditional foraging habitat use areas that are permanently lost or degraded as a result of implementing CALFED actions.
2. To the extent practicable, avoid construction- and recreation-related disturbances that could be associated with implementing CALFED actions up to within 0.5 mile of active nest sites during the nesting period (mid-January through August).
3. To the extent practicable, avoid implementing CALFED actions that could result in the degradation or loss of nesting structures.
4. To the extent consistent with CALFED objectives, manage restored or enhanced habitats under the ERP to maintain desirable rodent populations and minimize potential impacts associated with rodent control.
5. To the extent consistent with ERP objectives, restore perennial grasslands adjacent to occupied nest sites to provide foraging and nesting habitat areas suitable for the natural expansion of populations.

Grasshopper sparrow (*Ammodramus savannarum*)

1. Conduct surveys in suitable nesting habitat within portions of the species' breeding range that could be affected by CALFED actions to locate nesting pairs before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.
2. To the extent practicable, avoid disturbances to nesting pairs that could be associated with implementing CALFED actions during the nesting period (April through mid-July).
3. To the extent consistent with ERP objectives, design and manage grassland and agricultural habitat restorations and enhancements within the species' range to provide suitable nesting and foraging habitat conditions.

Long-billed curlew (*Numenius americanus*)

1. Restore or enhance 1-2 acres of suitable tidal flat, seasonal wetland, grassland, upland cropland, or seasonally flooded agriculture foraging habitat area for each acre of traditional foraging habitat use area that is converted to unsuitable foraging habitat as a result of implementing CALFED actions.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

2. To the extent consistent with ERP objectives, design and manage aquatic, wetland, grassland, and agricultural habitat restorations and enhancements to provide suitable foraging habitat conditions.

Long-eared owl (*Asio otus*)

1. Conduct surveys in suitable nesting habitat within portions of the species’ breeding range that could be affected by CALFED actions to locate active nest sites before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.
2. To the extent practicable, avoid disturbances to nesting pairs that could be associated with implementing CALFED actions up to within 0.25 mile of active nest sites during the nesting period (March-July).
3. Restore or enhance 2-5 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
4. To the extent consistent with ERP objectives, enhance and restore natural and agricultural habitats adjacent to occupied nesting habitats to create buffer habitat to protect nesting pairs from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.
5. To the extent consistent with ERP objectives, manage restored or enhanced habitats to maintain desirable rodent populations and minimize potential impacts associated with rodent control.

Mountain plover (*Charadrius montanus*)

1. To the extent consistent with ERP objectives, manage a portion of agricultural habitats within traditional wintering areas to maintain or enhance foraging habitat conditions.

Northern spotted owl (*Strix occidentalis caurina*)

1. Avoid construction- and recreation-related disturbances that could be associated with implementing CALFED actions up to within 0.5 mile of active nest sites during the nesting period (March-June).
2. To the extent practicable, avoid implementing CALFED actions that could result in the loss of traditional nesting sites or degradation of natural habitat area up to within 0.5 mile of traditional nest sites.
3. To the extent consistent with CALFED actions, design and implement Watershed CALFED actions to maintain, enhance, or restore suitable habitat within the species’ current range.

Northern harrier (*Circus cyaneus*) and short-eared owl (*Asio flammeus*)

Table C: Conservation Measures for Species with “m” Management Goals (continued)

1. Restore or enhance 1-2 acres of suitable nesting wetland or grassland habitat for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
2. To the extent consistent with ERP objectives, design and manage wetland, grassland, and agricultural-land habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.
3. To the extent consistent with ERP objectives, restore wetland and perennial grassland habitats adjacent to occupied nesting habitats to create a buffer zone of natural habitat to protect nesting pairs from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.
4. To the extent consistent with objectives, manage agricultural lands to be enhanced under the ERP to maintain or increase prey populations.
5. Avoid disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (April-August).

Osprey (*Pandion haliaetus*)

1. Conduct surveys to determine the presence and distribution of active nest sites along the Sacramento River and other major tributaries to the Bay-Delta before implementing CALFED actions that could result in the loss of nesting structures or disturbance to nesting pairs.
2. To the extent practicable, avoid disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (March-August).
3. To the extent practicable, avoid implementing CALFED actions that could result in the degradation or loss of nesting structures.

Tricolored blackbird (*Agelaius tricolor*)

1. Conduct surveys in suitable nesting habitat within portions of the species' range that could be affected by CALFED actions to locate nesting colonies before implementing CALFED actions that could result in the loss or degradation of traditional nesting habitat area or disturbance to nesting colonies.
2. To the extent practicable, avoid disturbances to nesting colonies that could be associated with implementing CALFED actions up to within 0.25 mile of active nesting colonies during the nesting period (mid-April through July).
3. To the extent consistent with ERP objectives, design and manage wetland and agricultural habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.
4. To the extent consistent with ERP objectives, enhance and restore natural and agricultural habitats adjacent to known nesting colonies to create a buffer zone of natural habitat to protect colonies from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

Western burrowing owl (*Athene cunicularia hypugea*)

1. Restore or enhance 1-2 acres of suitable nesting habitat area for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
2. To the extent consistent with ERP objectives, design and manage grassland and agriculture land habitat restorations and enhancements to provide suitable foraging habitat conditions.
3. To the extent consistent with ERP objectives, restore perennial grasslands adjacent to occupied nesting habitats to provide foraging and nesting habitat areas suitable for the natural expansion of populations.
4. Avoid disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (March-August).
5. To the extent consistent with ERP objectives, manage restored or enhanced habitats under the ERP to maintain desirable rodent populations and minimize potential impacts associated with rodent control.

Western least bittern (*Ixobrychus axilis*)

1. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the degradation or loss of occupied nesting habitat areas.
2. Restore or enhance 1-2 acres of suitable nesting wetland or grassland habitat for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
3. To the extent consistent with ERP objectives, design and manage wetland habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.
4. To the extent consistent with ERP objectives, restore wetland habitats adjacent to occupied nesting habitats to create a buffer zone of natural habitat to protect nesting pairs from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.
5. To the extent consistent with CALFED objectives, avoid disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (April-August).

Western snowy plover (*Charadrius alexandrinus nivosus*)

1. Conduct surveys to determine the presence and distribution of western snowy plovers suitable habitat within its known nesting range before implementing CALFED actions that could result in the loss or degradation of occupied nesting habitat.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

2. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the degradation or loss of occupied nesting habitat areas.
3. Restore or enhance 1-2 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.
4. Avoid disturbances to nesting birds and nest sites that could be associated with implementing CALFED actions near active nest sites during the nesting period (March-July).

White-tailed kite (*Elanus leucurus*)

1. Conduct surveys in suitable nesting habitat within the breeding range of the white-tailed kite to locate active nest sites before implementing CALFED actions that could result in the loss or degradation of occupied nesting habitat or disturbance to nesting pairs.
2. To the extent practicable, avoid disturbances to nesting pairs that could be associated with implementing CALFED actions up to within 0.25 mile of active nest sites during the nesting period (February-September).
3. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could result in the loss of traditional nesting trees.
4. Restore or enhance 2-5 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions. Restored or enhanced compensation habitat should be located in areas that support nesting pairs and near valley oak woodlands.
5. To the extent consistent with ERP objectives, enhance and restore natural habitats and agricultural habitats adjacent to occupied nesting habitats to create a buffer zone of natural habitat to protect nesting pairs from potential adverse effects that could be associated with future changes in land use on nearby lands and to provide foraging and nesting habitat areas suitable for the natural expansion of populations.
6. Manage restored or enhanced habitats under the ERP to maintain desirable rodent populations and minimize potential impacts associated with rodent control.

Yellow-breasted chat (*Icteria virens*)

1. Conduct surveys in suitable nesting habitat within portions of the species' breeding range that could be affected by CALFED actions to locate nesting pairs before implementing CALFED actions that could result in the loss or degradation of occupied nesting habitat or disturbance to nesting pairs.
2. To the extent practicable, avoid disturbances to nesting pairs that could be associated with implementing CALFED actions during the nesting period (May-August).
3. Restore or enhance 2-5 acres of suitable nesting habitat near affected areas for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of implementing CALFED actions.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

4. To the extent consistent with ERP objectives, design and manage riparian habitat restorations and enhancements to provide suitable nesting and foraging habitat conditions.

Alameda whipsnake (*Masticophis lateralis euryxanthus*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 2-5 acres of existing occupied habitat for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 2-5 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. To the extent practicable, capture individuals from habitat areas that would be affected by CALFED actions and relocate them to nearby suitable existing, restored, or enhanced habitat areas.

San Joaquin whipsnake (*Masticophis flagellum ruddocki*) and Blunt-nosed leopard lizard (*Gambelia silus*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 1-3 acres of existing occupied habitat areas for every acre of occupied habitat affected by CALFED actions or B) enhance or restore 1-3 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. To the extent practicable, capture individuals from habitat areas that would be affected by CALFED actions and relocate them to nearby suitable existing, restored, or enhanced habitat areas.

Western pond turtle (*Clemmys marmorata*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 1 to 5 acres of existing occupied habitat areas for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 1-5 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

2. To the extent practicable, capture individuals from habitat areas that would be affected by CALFED actions and relocate them to nearby suitable existing, restored, or enhanced habitat areas.

California red-legged frog (*Rana aurora draytonii*), foothill yellow-legged frog (*Rana boylei*), western spadefoot toad (*Scaphiopus hammondi*), and California tiger salamander (*Ambystoma californiense*)

1. Avoid implementing CALFED actions that could adversely affect the connectivity of habitat corridors among existing metapopulations.

2. Where occupied habitat would be adversely affected by CALFED actions 1) acquire, protect, and manage 1-3 acres of existing occupied habitat areas for every acre of occupied habitat affected by CALFED actions or 2) enhance or restore 1-3 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

3. To the extent practicable, remove or exclude individuals from the affected area to avoid potential construction-related mortality of individuals or, if habitat will be permanently lost as a result of actions, capture individuals from the affected area and relocate to nearby suitable existing, restored, or enhanced habitat areas that do not support non-native predator populations.
4. To the extent consistent with CALFED objectives, avoid implementing CALFED actions that could increase or attract non-native predator populations to occupied habitat areas.
5. To the extent consistent with ERP objectives, enhance or restore suitable habitats near occupied habitat areas.

Limestone salamander (*Hydromantes brunus*) and Shasta salamander (*Hydromantes shastae*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 2-5 acres of existing occupied habitat areas for every acre of occupied habitat affected by CALFED actions or B) enhance or restore 2-5 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.
2. To the extent practicable, remove or exclude individuals from the affected area to avoid potential construction-related mortality of individuals or, if habitat will be permanently lost as a result of actions, capture individuals from the affected area and relocate to nearby suitable existing, restored, or enhanced habitat areas that do not support non-native predator populations.

Hardhead (*Mylopharodon conocephalus*) and Rough sculpin (*Cottus asperimus*)

No additional conservation measures are required.

Tidewater goby (*Eucyclogobius newberryi*)

1. Conduct research to assess the probability for the introduction of non-native competitors in delivered water into goby-occupied coastal habitat areas and to identify measures to avoid or minimize the potential for such introductions.

Central coast steelhead (*Oncorhynchus mykiss [c]*) evolutionarily significant unit

1. To the extent consistent with CALFED objectives, avoid implementing actions that could adversely affect the species when it is present in streams.
2. To the extent consistent with CALFED objectives, do not alter current flow regimes in occupied streams in a manner that would be detrimental to the species.

Monarch Butterfly (aggregation areas) (*Danaus plexippus*)

1. Avoid implementing any CALFED actions that potentially could result in the loss or degradation of traditional monarch butterfly aggregation habitat that is used by more than 3,000 butterflies or could cause abandonment of these aggregation areas.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

California Freshwater Shrimp (*Syncaris pacifica*)

1. To the extent consistent with ERP objectives, enhance or restore suitable habitats near occupied habitat areas.

Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), Mid-valley fairy shrimp (*Branchinecta n. sp. “mid-valley”*), vernal pool tadpole shrimp (*Lepidurus packardii*), and vernal pool fairy shrimp (*Branchinecta lynchi*)

1. Avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of the species’ populations, or result in the degradation or loss of habitat within 250 feet of occupied vernal pools.
2. If implementation of CALFED actions could result in relatively minor impacts on these species, CALFED will implement mitigation actions identified in USFWS’s programmatic biological opinion for projects that could have small effects on these species (USFWS 1996).
3. To the extent consistent with ERP objectives, enhance or restore suitable habitats to benefit the species in occupied habitat areas.

Shasta sideband (*Monadenia troglodytes*)

1. Where occupied habitat would be adversely affected by CALFED actions A) acquire, protect, and manage 2-5 acres of existing occupied habitat areas for every acre within the same area of occupied habitat affected by CALFED actions or B) enhance or restore 2-5 acres of suitable habitat near affected areas for every acre of occupied habitat affected by CALFED actions.
2. To the extent practicable, remove or exclude individuals from the affected area to avoid potential construction-related mortality of individuals or, if habitat will be permanently lost as a result of actions, capture individuals from the affected area and relocate to nearby suitable existing, restored, or enhanced habitat areas.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

Callippe silverspot butterfly (*Speyeria callippe callippe*)

1. Avoid implementing CALFED actions that potentially could result in harm or mortality to individuals or viability of the population.

Rose mallow (*Hibiscus lasiocarpus*)

1. To the extent practicable, avoid adverse effects on the ecological processes that support the dynamic habitat of rose mallow throughout the species' range and associated with existing source populations.
2. Conduct research to determine the extent and physical and biological qualities of existing habitat and populations before implementing actions to rehabilitate or restore levees.
3. To the extent consistent with ERP objectives, create unvegetated, exposed substrate at tidal margins of restored and created tidal fresh emergent wetland and riparian habitats.
4. For each linear foot of species-occupied habitat lost or degraded as a result of implementing CALFED actions, create 5-10 linear feet of suitable habitat of equal or higher habitat quality within 1 year of loss.
5. To the extent consistent with CALFED objectives, incorporate suitable habitat for this species into levee improvement, levee setback, and channel island habitat restoration designs.
6. To the extent consistent with ERP objectives, maximize sinuosity of restored and created slough channels to increase water-land edge habitat.

Ione buckwheat (*Eriogonum apricum* var. *apricum*), Irish Hill buckwheat (*Eriogonum apricum* var. *prostratum*), Ione manzanita (*Arctostaphylos myrtifolia*), and Parry's horkelia (*Horkelia parryi*) Stebbins' morning-glory (*Calystegia stebbinsii*), Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flanelbush (*Fremontodendron californicum* ssp. *decumbens*), El Dorado bedstraw (*Galium californicum* ssp. *sierrae*) and Layne's ragwort (*Senecio layneae*)

1. Monitor all sites occupied by these species that are managed under CALFED over time, especially following management activities and, through adaptive management, modify activities as needed to maintain or increase current population levels.

Slender Orcutt grass (*Orcuttia tenuis*), Hoover's spurge (*Chamaesyce hooveri*), succulent owl's clover (*Castilleja campestris* ssp. *succulenta*), Boggs Lake hedge-hyssop (*Gratiola heterosepala*), Greene's legenere (*Legenere limosa*) and spiny-sepaled button-celery (*Eryngium spinosepalum*)

2. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species' populations, or result in the degradation or loss of their natural habitat within 250 feet of occupied vernal pools.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

3. Where species-occupied low-quality, non-natural habitat is lost or degraded as a result of implementing CALFED actions, preserve existing species habitat at a ratio of 3 acres of preserved habitat per 1 acre of affected habitat and restore 1 acre of habitat elsewhere per 1 acre of affected habitat. Preserved and restored habitats should be located within 40 miles on the same geomorphic surface as the affected habitat.
4. To the extent consistent with ERP objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

Marsh skullcap (*Scutellaria galericulata*)

1. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species' populations, or result in the degradation or loss of high-quality occupied habitat.
2. If occupied low-quality habitat is lost or degraded as a result of implementing CALFED actions, preserve existing species habitat at a ratio of 3 acres of preserved habitat per 1 acre of removed habitat and restoration of 1 acre of restored habitat elsewhere per acre of removed habitat. Preserved and restored habitats should be located within 40 miles on the same geomorphic surface as the affected habitat.
3. To the extent consistent with CALFED objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

San Joaquin woollythreads (*Lembertia congdonii*), Big tarplant (*Blepharizonia plumosa* ssp. *plumosa*), Lost Hills crownscale (*Atriplex vallicola*), shaggyhair lupine (*Lupinus spectabilis*), adobe-lily (*Fritillaria pluriflora*)

1. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species' populations, or result in the degradation or loss of high-quality species-occupied natural habitat areas.
2. If occupied habitat is lost or degraded as a result of implementing CALFED actions, preserve (preferably by acquisition) 6 acres of high-quality occupied habitat and preserve 1 acre of suitable unoccupied habitat for every acre of habitat affected by CALFED.
3. Develop a seedbank from all populations affected by implementation of CALFED actions and use the collected seed for inoculating unoccupied suitable habitat.
4. To the extent consistent with ERP objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

Sanford's arrowhead (*Sagittaria sanfordii*) and four-angled spike-rush (*Eleocharis quadrangulata*)

1. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species' populations, or result in the degradation or loss of high-quality species-occupied natural habitat areas.
2. If occupied habitat is lost or degraded as a result of implementing CALFED actions, restore or create 1 acre of suitable habitat for every acre of affected habitat supported by a natural hydrologic regime.
3. To the extent consistent with CALFED objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

Marin western flax (*Hesperolinon congestum*), Napa western flax (*Hesperolinon serpentinum*), Rawhide Hill onion (*Allium tuolumnense*), Red Hills soaproot (*Chlorogalum grandiflorum*), Brandaegae’s eriastrum (*Eriastrum brandegae*), Tehama County western flax (*Hesperolinon tehamense*), Brewer’s western flax (*Hesperolinon breweri*), Dimorphic snapdragon (*Antirrhinum subcordatum*), Drymaria-like western flax (*Hesperolinon drymarioides*), Madera linanthus (*Linanthus serrulatus*), Hall’s bush mallow (*Malacothamnus hallii*), Ahart’s paronychia (*Paronychia ahartii*), English peak greenbriar (*Smilax jamesii*)

1. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species’ populations, or result in the degradation or loss of high-quality species-occupied natural habitat areas.
2. If occupied habitat is lost or degraded as a result of implementing CALFED actions, preserve (preferably by acquisition) 6 acres of high-quality occupied habitat and preserve 1 acre of suitable unoccupied habitat elsewhere for every acre of unoccupied suitable habitat affected by CALFED. Preserved and restored habitats must be located within 40 miles on the same geomorphic surface as the affected habitat.
3. Develop a seedbank from all populations affected by implementation of CALFED actions and use the collected seed for inoculating unoccupied suitable habitat.
4. To the extent consistent with CALFED objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

Hoover’s eriastrum (*Eriastrum hooveri*), El Dorado County mule ears (*Wyethia reticulata*), most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoenus*), recurved larkspur (*Delphinium recurvatum*), Big Bear Valley woollypod (*Astragalus leucolobus*), Jepson’s milk-vetch (*Astragalus rattanii* var. *jepsonianus*), Mt. Diablo fairy-lantern (*Calochortus pulchellus*), dwarf soaproot (*Chlorogalum pomeridianum* var. *minus*), adobe-lily (*Fritillaria pluriflora*), Diablo helianthella (*Helianthella castanea*), Congdon’s tarplant (*Hemizonia parryi* ssp. *congdonii*), Brittle scale (*Atriplex depressa*), San Joaquin spearscale (*Atriplex joaquiniana*), heartscale (*Atriplex cordulata*)

1. To the extent practicable, avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of these species’ populations, or result in the degradation or loss of high-quality occupied natural habitat areas.
2. If occupied habitat is lost or degraded as a result of implementing CALFED actions, restore or create 1 acre of suitable habitat for each acre of affected habitat. Preserved and restored habitats must be located within 40 miles on the same geomorphic surface as the affected habitat.
3. Develop a seedbank from all populations affected by implementation of CALFED actions and use the collected seed for inoculating unoccupied suitable habitat.
4. To the extent consistent with ERP objectives, enhance or restore suitable habitats to benefit these species in occupied habitat areas.

Table C: Conservation Measures for Species with “m” Management Goals (continued)

Clara Hunt’s milk-vetch (*Astragalus clarianus*), large-flowered fiddleneck (*Amsinkia grandiflora*), red-flowered lotus (*Lotus rubriflorus*), California seablite (*Suaeda californica*), lesser saltscare (*Atriplex minuscula*), Ferris’s milk-vetch (*Astragalus tener* var. *ferrisiae*), Sonoma sunshine (*Blennosperma bakeri*), Loch Lomond button-celery (*Eryngium constancei*), Ahart’s dwarf rush (*Juncus leiospermus* var. *ahartii*), Contra Costa goldfields (*Lasthenia conjugens*), Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*), Sebastopol meadowfoam (*Limnanthes vinculans*), few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*), many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*), pincushion navarretia (*Navarretia myersii*), Colusa grass (*Neostaphia colusana*), San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*), hairy Orcutt grass (*Orcuttia pilosa*), Sacramento Orcutt grass (*Orcuttia viscida*), North Coast semaphore grass (*Pleuropogon hooverianus*), Green’s tuctoria (*Tuctoria greenii*), Henderson’s bent grass (*Agrostis hendersonii*), Chinese Camp brodiaea (*Brodiaea pallida*), white sedge (*Carex albida*), bristly sedge (*Carex comosa*), slough thistle (*Cirsium crassicaule*), Pitkin Marsh lily (*Lilium pardalinum* ssp. *pitkinense*), eel-grass pondweed (*Potamogeton zosteriformis*), Kenwood Marsh checkerbloom (*Sidalcea oregana* ssp. *valida*), California beaked-rush (*Rhynchospora californica*), Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), Napa blue grass (*Poa napensis*), mad-dog skullcap (*Scutellaria lateriflora*), Calistoga popcornflower (*Plagiobothrys strictus*), Point Reyes bird’s-beak (*Cordylanthus maritimus* ssp. *palustris*), hispid bird’s-beak (*Cordylanthus mollis* ssp. *hispidus*), Marin knotweed (*Polygonum marinense*), palmate-bracted bird’s-beak (*Cordylanthus palmatus*), tree-anemone (*Carpenteria californica*), Sharsmith’s onion (*Allium sharsmithae*), Klamath manzanita (*Arctostaphylos klamathensis*), vernal pool smallscale (*Atriplex persistens*), Shasta clarkia (*Clarkia borealis* ssp. *arida*), beaked clarkia (*Clarkia rostrata*), silky cryptantha (*Cryptantha crinita*), Hall’s tarplant (*Hemizonia halliana*), pale-yellow layia (*Layia heterotricha*), Bellinger’s meadowfoam (*Limnanthes floccosa* ssp. *bellingeriana*), Mt. Tedoc linanthus (*Linanthus serrulatus*), Shasta snow-wreath (*Neviusia cliftonii*), thread-leaved beardtongue (*Penstemon filiformis*), Mt. Diablo phacelia (*Phacelia phacelioides*)

1. Conduct surveys in suitable habitat areas that could be affected by CALFED actions to determine whether species are present before implementing actions that could result in the loss or degradation of occupied habitat.
2. Avoid implementing any CALFED actions that potentially could result in harm or mortality to individuals or viability of populations of these species.

Marsh checkerbloom (*Sidalcea oregana* ssp. *hydrophila*)

1. Conduct surveys in suitable habitat areas that could be affected by CALFED actions to determine whether species are present before implementing actions that could result in the loss or degradation of occupied habitat.
 2. Conduct research to determine the ecological requirements of this species and formulate and implement appropriate conservation measures to protect the species from potential adverse affects of implementing CALFED actions.
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