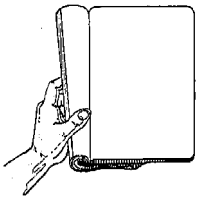
Chapter 4. Guide to Impact Analyses and Description of Land Use Assumptions

This chapter provides a road map for the impact analyses. It also explains some of the approaches used in assembling the range of land use changes that may occur as a result of CALFED Bay-Delta Program implementation.



4. Guide to Impact Analyses and Description of Land Use Assumptions

4.1 GUIDE TO IMPACT ANALYSES

This chapter is included to help readers understand how the impact analyses are presented in Chapters 5, 6, and 7. Information on the environmental consequences of the alternatives presented in this document was derived primarily from a series of technical reports. These technical reports were prepared for many of the resource categories and form the basis for the affected environment and environmental consequences descriptions in the March 1998 Draft Programmatic EIS/EIR and Chapters 5, 6, and 7 of this report. Since the CALFED Bay-Delta Program (Program) alternatives described in this report incorporate elements of the alternatives presented in the March 1998 Draft Programmatic EIS/EIR and the impacts are similar, information in the technical reports was verified and used in these analyses—along with additional modeling runs for the operations and water supply, and updated information where it was available.

Because the Preferred Program Alternative was identified after the preparation of the March 1998 Draft Programmatic EIS/EIR, the Program decided to rewrite the Draft Programmatic EIS/EIR rather than simply update or supplement the March 1998 version. Comments received on the March 1998 Draft Programmatic EIS/EIR were catalogued, and many of the issues noted in those comments were incorporated into the revised program plans. Where possible, they are also identified and addressed in the impact analyses.

Resources evaluated in this Programmatic EIS/EIR have been grouped into three main categories, as illustrated in Table 4-1.

- Physical environment
- Biological environment
- Land use, social issues, and economics

To provide a quick visual reference for the reader, a topic illustration is included in the footer for each resource. For example, the reference illustration for the air quality resource impact analysis is a hot air balloon.

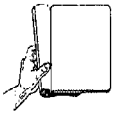


Table 4-1. Resource Categories Evaluated in the Final Programmatic EIS/EIR

CHAPTER 5
PHYSICAL ENVIRONMENT

- Water Supply and Water Management
- Bay-Delta Hydrodynamics and Riverine Hydraulics
- Water Quality
- Groundwater Resources
- Geology and Soils
- Noise
- Transportation
- Air Quality

CHAPTER 6
BIOLOGICAL ENVIRONMENT

- Fisheries and Aquatic Ecosystems
- Vegetation and Wildlife

CHAPTER 7
LAND USE, SOCIAL ISSUES, AND ECONOMICS

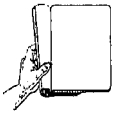
- Agricultural Land and Water Use
- Agricultural Economics
- Agricultural Social Issues
- Urban Land Use
- Urban Water Supply Economics
- Utilities and Public Services
- Recreation Resources
- Flood Control
- Power Production and Energy
- Regional Economics
- Cultural Resources
- Public Health and Environmental Hazards
- Visual Resources
- Environmental Justice
- Indian Trust Assets

The Program currently consists of multiple possible actions that are diverse, geographically dispersed, and described in general terms. Some or all of these actions will be carried out over the course of many years. In addition, the timing, location, and magnitude of many of the actions is not yet known, which results in some uncertainty regarding the precise outcome of Program actions. Consequently, the Program will be implemented in stages, using the information gained in each stage to modify and refine Program actions over time, within the framework of the Preferred Program Alternative. Given the uncertainties, the large scope of the Program area, and the conceptual nature of the proposed actions, the Program elected to prepare a Programmatic EIS/EIR.

This document provides a broad and comprehensive overview of the potential actions that could be taken by the Program. It describes, in a broad sense, the overall and long-term environmental consequences of all the potential proposed actions at the end of the Program's 30-year time span. This Programmatic EIS/EIR is structured to be used as a tiering document. Individual, second-tier projects can use this analysis as a basis from which to supplement and refine the level of detail and can incorporate by reference relevant provisions in the Programmatic EIS/EIR, such as the cumulative impacts. Mitigation strategies are included to address potentially significant adverse environmental impacts and will be applied to guide the formulation of project-level mitigation measures. Any subsequent actions or facility construction stemming from the programmatic actions in the Preferred Program Alternative must be developed in compliance with NEPA, CEQA, and other applicable laws and regulatory processes.

The organization of a typical resource discussion is depicted in Figure 4-1. The impact analysis for most resource categories is divided into several parts, including a summary, a description of the affected environment/existing conditions, and discussions of environmental consequences—including such topics as cumulative and growth-inducing impacts. Each of these divisions is explained more fully below.

Summary. The summary provides the conclusions of the detailed impact analysis. It gives an overview of the benefits and potentially significant adverse impacts that could result from implementing the Program, and lists possible mitigation strategies to lessen potentially significant impacts. Information presented in the summary for each resource is the basis for the summary comparison of impacts presented in Chapter 3. Tables in each resource section summarize the most significant adverse impacts and mitigation



strategies that apply to them. However, not all impacts and mitigation strategies are listed in the tables. Please see the text of each resource category for additional detail.

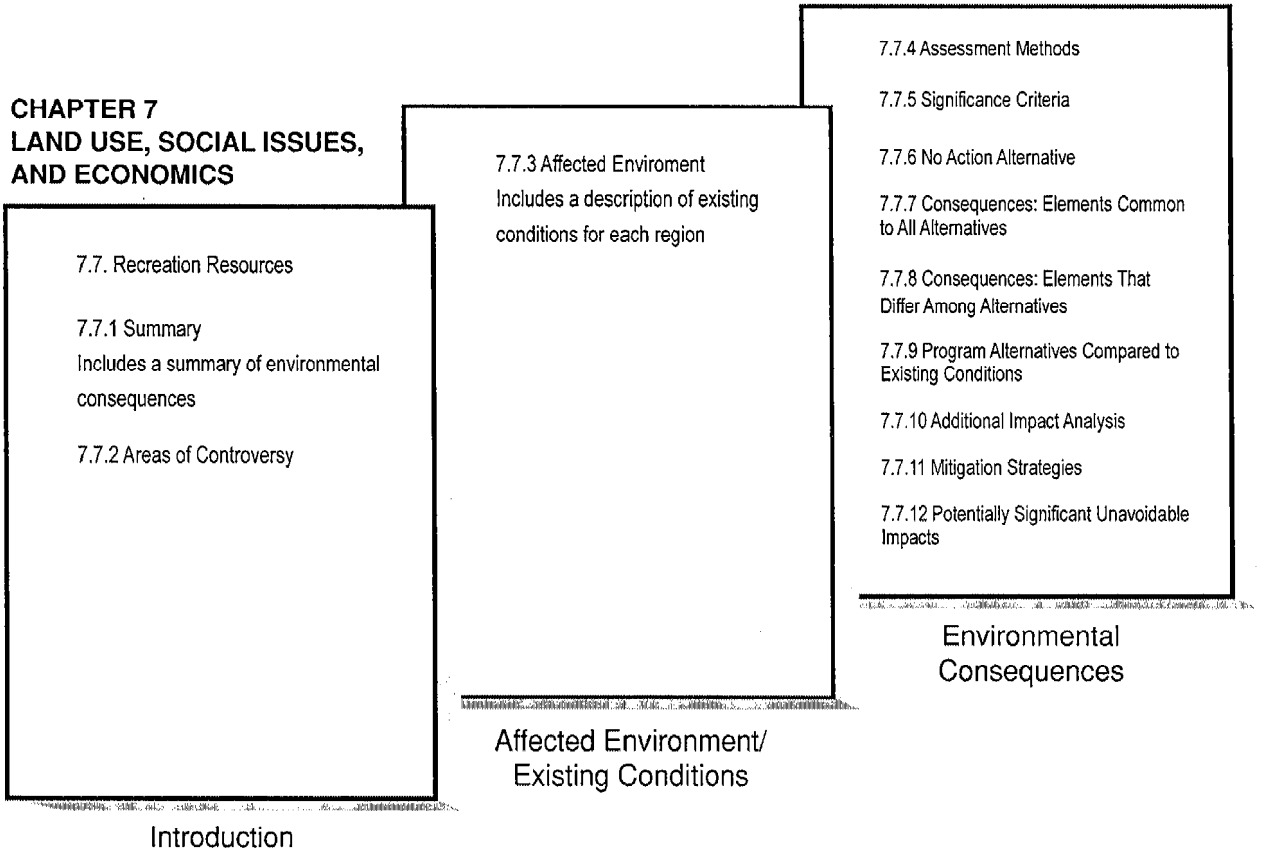


Figure 4-1. Organization of a Resource Discussion Using Recreation as the Example

Areas of Controversy. As used in CEQA, areas of controversy include differences of opinion among technical experts. The opinions of technical experts can differ, depending on which assumptions or methodology they use. Areas of controversy were identified by comments from CALFED agencies, public comments, and new information developed since the March 1998 Draft Programmatic EIS/EIR. For some resources, issues that do not meet areas of controversy as used in CEQA have been raised by a number of people. For recreation resources, for example, the effects on motorized boating in the Delta or of flooding free-flowing rivers by enlarging existing reservoirs are controversial issues but do not represent disagreement among the technical experts. These types of issues also are noted in the "Areas of Controversy" section. Although listing areas of concerns is not required by NEPA or CEQA, the Program decided to acknowledge concerns mentioned in the public review process. In most cases, the concerns are addressed in the impact analyses. In some cases, however, the concerns cannot be addressed at the programmatic level and will need to be addressed in second-tier documents.

Affected Environment/Existing Conditions. The "Affected Environment/Existing Conditions" section provides a historical perspective and an overview of the current conditions for each resource. The description of

current conditions uses verified information. The discussions are organized by region, in the following order:

- Delta Region
- Bay Region
- Sacramento River Region
- San Joaquin River Region
- Other SWP and CVP Service Areas

The regulatory framework that is part of the existing conditions can be found in Section 2 of Chapter 8, "Compliance with Applicable Laws, Policies, and Plans and Regulatory Framework."

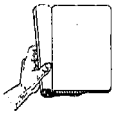
Program regions are combined into a single discussion when their existing conditions/affected environment discussions are similar. Upper watershed descriptions for each resource are discussed, where relevant, under the various regions.

Assessment Methods. Descriptions of assessment methods are resource specific, and provide the approach used to identify and assess the environmental consequences for the resource category. Analytical models used in the evaluation also are identified.

Significance Criteria. The threshold of significance for many of the environmental resources discussed in this impact analysis is described in qualitative terms and covers a broader spectrum of impacts than would be included in a site-specific, project-level analysis. This is in part because the Program covers a wide variety of types of actions that will take place in many different physical settings over a 30-year period. Consequently, the thresholds for most resources cannot be established with a precise, quantitative measurement. The measure of significance will vary depending on the nature and type of the proposed actions, the site characteristics where the actions take place, and how they affect the existing conditions at the time of the proposed actions. The thresholds used in this Programmatic EIS/EIR are intended to identify potentially significant impacts at a programmatic level and to provide guidance for developing significance criteria at the second tier. The thresholds also provide a tool to predict whether it is likely that the impacts identified as potentially significant at the programmatic level can be avoided, reduced, or mitigated to a less-than-significant level.

No Action Alternative. This section presents the environmental consequences of the No Action Alternative compared to existing conditions. The No Action Alternative makes predictions about the future condition of environmental resources, taking into consideration recently constructed projects and projects proposed for construction. For the No Action Alternative, assumptions based on current expectations are made about existing trends that may continue into the future and about future water project operations. For example, urbanization that is expected to continue would require additional land and water resources, with consequences on a variety of environmental resources. A list of projects included in the No Action Alternative impact analysis and water operation modeling assumptions are provided in Attachment A.

The impacts of each of the four Program alternatives are compared to both the No Action Alternative and the existing conditions/affected environment in Chapters 5, 6, and 7, of the impact analysis section of this Programmatic EIS/EIR. Under the No Action Alternative, it is assumed that certain changes in the environment will occur regardless of whether any of the Program alternatives are implemented. For example, it is anticipated that trends in population growth and urbanization will continue, but the rate at which these trends will continue and the locations where they will occur cannot be projected except very generally. The same is true for any environmental impacts caused by growth and urbanization. It is



likely that these changes would result in potentially significant impacts on the resources evaluated (land use, air quality, water quality, vegetation and wildlife, fisheries, and others), but there is no accurate way to predict how severe those impacts may be or where they will occur.

Because of the broad programmatic nature of the project, the 30-year planning horizon, and the inability to precisely predict future conditions, it is difficult to distinguish in any meaningful way the differences between the conditions under the No Action Alternative and existing conditions. Consequently, the environmental impacts of the actions included in the Program alternatives when compared to existing conditions are described as being very similar to the impacts of those alternatives when compared to what is expected to happen under a future no-action scenario.

Program Alternatives. This section presents the consequences of the four Program alternatives.

Social and economic changes resulting from a project are treated somewhat differently under CEQA and NEPA. CEQA does not treat economic or social changes resulting from a project as significant effects on the environment. However, if a physical change in the environment is caused by economic or social effects, the physical change may be regarded as a significant effect when using the same criteria for other physical changes from the project. In addition, economic and social effects of a project may be used to assess the significance of a physical effect. Under NEPA, economic or social effects must be discussed if they are inter-related to the natural or physical environmental effects of a project. Economic and social effects are presented and methods to avoid or reduce adverse social and economic effects are addressed, as applicable, in the text of each environmental consequences chapter in the Programmatic EIS/EIR.

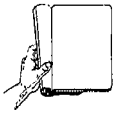
For most resources, the Levee System Integrity Program actions would affect only the Delta and Bay Regions, and the program is not discussed for other Program regions. The Levee System Integrity Program impacts on Suisun Marsh are discussed under the "Bay Region."

Because of the system-wide nature of the resource, the power and energy section is presented in a system-wide format. The water supply and Bay-Delta hydrodynamics and riverine hydraulics sections modify the definition of the San Joaquin River Region and the Other SWP and CVP Service Areas to better describe consequences affecting water supplies and flows in those regions.

Program Elements with Consequences Common to All Alternatives. This section presents the environmental consequences of the Program elements that are similar to all alternatives. Generally, the environmental consequences of all Program elements are the same for each alternative. This description of environmental consequences also is presented by Program region. For brevity, regions are combined when environmental consequences are similar.

Program Elements with Consequences That Differ Among Alternatives. The consequences of Program elements that differ among the alternatives primarily are associated with conveyance in the Delta Region; therefore, this section is presented by alternative rather than by region. Other regions are included as subsections, where applicable. For brevity, Program regions are combined where environmental consequences are similar.

Program Alternatives Compared to Existing Conditions. Under CEQA, the existing conditions are normally the baseline for comparison of the effects of the project and are presented in this section. This discussion ensures that all potentially significant impacts are identified. In most cases, because of the programmatic nature of the environmental assessment and the long planning horizon, the conditions present under the existing conditions baseline are similar to those under the No Action Alternative. In these situations,



differences between existing conditions and No Action Alternative cannot be distinguished in a meaningful way at the programmatic level, and the results of comparison of each alternative to the No Action Alternative and to existing conditions are the same. Where potential meaningful differences exist between the comparison to existing conditions and the No Action Alternative, the differences are identified and discussed in the this section.

Additional Impact Analysis. Four other topics are included in the impact analysis: cumulative impacts, growth-inducing impacts, the relationship between short-term uses of the environment and maintaining and enhancing long-term productivity, and irreversible and irretrievable commitments of resources. A summary of each of these topics is included in Chapter 3, and they are described below.

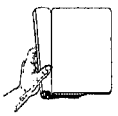
Cumulative Impacts. Cumulative environmental impacts must be addressed in EIRs and EISs under both CEQA and NEPA. NEPA defines cumulative impacts as those impacts that result from the "incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency...or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The definition of cumulative impacts under CEQA is similar: "Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Attachment A to this Programmatic EIS/EIR contains a list of other projects and activities considered in the cumulative impact analysis.

The analysis of cumulative impacts in this document considers the long-term environmental impacts of the CALFED Program, including those that would be less than significant, together with similar impacts of other projects. The other projects reviewed for this analysis are listed in Attachment A. Since the CALFED Program actions will affect a large geographic area over a 30-year time frame, many impacts of the Program that might not be significant in a short-term, site-specific analysis are treated as significant at this programmatic level of review. No additional environmental impacts that individually would be minor, but collectively significant, were identified. As a result, the analysis of the Project's contribution to cumulative impacts is very similar to the analysis of its long-term impacts. The mitigation strategies identified for the CALFED Program impacts are also applicable to mitigate the CALFED Program's cumulative impacts.

The CALFED Program involves the approval of a program to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The Program is a general description of a range of actions that will be further refined, considered, and analyzed for site-specific environmental impacts as part of second- and third-tier environmental documents prior to making a decision to carry out these later actions. The Programmatic EIS/EIR focuses on a general overview of cumulative impacts and associated mitigation measures. Because this Programmatic EIS/EIR does not analyze the site-specific impacts of any projects, a detailed analysis of the Program's contributions to cumulative impacts and the methods to mitigate the cumulative impacts of second-tier projects tiering from this Programmatic EIS/EIR is not possible for most resource categories.

Later EIRs and EISs will incorporate the relevant cumulative and long-term impact analyses of this programmatic document and add detail about specific projects and their contribution to cumulative impacts. Any significant environmental impacts, including contributions to a cumulative impact, that this Programmatic EIS/EIR does not address will be evaluated in subsequent environmental reviews.

In general, the analysis of cumulative impacts is qualitative. Impacts were identified based on: (1) information extracted from existing environmental documents or studies for the resource categories



potentially affected by each project, and (2) knowledge of expected effects of similar projects in the study area. Because of the preliminary phase of most of the projects considered (environmental reviews may not have been initiated, drafted, or finalized), comparable environmental information for identifying cumulative impacts was sparse.

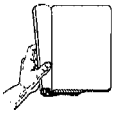
Chapter 3 contains a table that identifies, by region, the resource category where potentially significant cumulative adverse impacts resulting from the incremental impact of the Preferred Program Alternative, when added to the impacts of applicable projects and activities listed in Attachment A, are anticipated.

Growth-inducing Impacts. This section discusses the growth-inducing impacts that may result from implementation of the CALFED Program. Discussions of whether additional water supplies and/or improvements in water supply reliability cause growth-inducing impacts often result in differences of opinion among experts; therefore, this topic is considered an area of controversy as used in CEQA. Because this issue cannot be predicted with certainty, for this programmatic level of analysis, the assumption was made that any increase in water supplies and/or improvements in water supply reliability that are associated with the Program would stimulate growth, as discussed in Section 5.1. The effect of the Preferred Program Alternative on the majority of the resources discussed in this document will not induce additional growth; however, these resources could be affected by additional growth. At this programmatic level, it is unknown where any increases in population growth or construction of additional housing would take place, or what level of growth might be associated with improved water supply reliability/availability. Accordingly, it is premature to speculate on how this new growth would affect resources. When and if growth occurs, changes resulting from growth will be subject to local land use decisions by individual cities and counties. Future development at the local level is guided by many considerations, only one of which is the reliability of water supply. These other factors include the policies in local general plans and zoning ordinance restrictions; the availability of a wide range of community services and infrastructure, such as sewage treatment facilities and transportation infrastructure; the availability of developable land; the types and availability of employment opportunities; and the analysis and conclusions based on an environmental review of proposed projects pursuant to CEQA. These local land use decisions and the environmental impacts associated with these site-specific decisions are outside the scope of this Programmatic EIS/EIR but can and should be considered by the local governments acting on future development proposals.

For the chapters that address agricultural economics, agricultural social issues, urban water supply economics, regional economics, environmental justice, and Indian trust assets, the section is entitled "Growth-Inducing Effects" because social and economic changes from a project are treated somewhat differently under CEQA and NEPA.

Relationship Between Short-Term Uses and Long-Term Productivity. This section discusses the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. Resource-specific summaries of the short-term uses in the project areas and the maintenance and enhancement of long-term productivity in those areas are provided.

Irreversible and Irretrievable Commitments. This section fulfills the requirement to address irreversible and irretrievable commitments of resources. Irreversible impacts are those that cause, through direct or indirect effects, use or consumption of resources in such a way that they cannot be restored or returned to their original condition despite mitigation. If unavoidable, potentially irreversible impacts are documented in this report. An irretrievable impact or commitment of resources occurs when a resource is removed or consumed. These types of impacts are evaluated to ensure that consumption is justified.



Mitigation Strategies. Because this Programmatic EIS/EIR does not evaluate site-specific actions, no specific mitigation measures are presented. Instead, general mitigation strategies are identified as ways to avoid, minimize, restore, or compensate for potentially significant adverse impacts. For some resources, specific mitigation measures are provided as examples to display the array of techniques available in order to carry out the strategy. For example, construction activities can cause erosion of soils that leads to adverse impacts on water quality. A mitigation strategy would be to avoid and minimize the impact. Mitigation measures available to carry out this strategy include conducting work during dry periods and using erosion-control fencing or straw bales, water detention basins, and so forth.

The economic and social information analyses (agricultural economics, agricultural social issues, urban water supply economics, regional economics, and environmental justice) do not contain a separate mitigation strategies section. However, the Program has presented possible methods to alleviate potential adverse effects on these resources in the discussion of potential effects.

Potentially Significant Unavoidable Impacts. The final section is a discussion of potentially significant unavoidable impacts for each resource category. This section identifies potentially significant adverse impacts that are anticipated to remain significant even after implementing mitigation strategies and measures. For the economic and social information analyses, this section is titled "Adverse Effects."

4.2 CEQA DOCUMENT REQUIREMENTS

CEQA requires that certain subjects be documented in an environmental impact analysis. The following explanation is provided to assist the reader in locating these subjects. The locations of discussions about the subjects are noted following each subject.

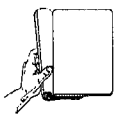
- Environmental setting. Descriptions of the affected environment that are relevant to each resource area addressed are included in each resource chapter, in Chapters 5, 6, and 7. This section includes discussions of historical and existing conditions.

- The significant environmental effects of the proposed project. Chapter 3 provides a table of all potentially significant environmental effects of the Preferred Program Alternative. The potentially significant environmental effects of each of the alternatives are discussed by resource category in Chapters 5, 6, and 7.

- Any potentially significant environmental effects that cannot be avoided if the proposal is implemented. Each environmental resource category begins with a summary. Potentially significant environmental effects that cannot be avoided are noted in these summaries.

- Cumulative impacts. Cumulative impacts are addressed in each environmental resource category in Chapters 5, 6, and 7. The potentially significant environmental effects that cannot be avoided are discussed by environmental resource category in Chapters 5, 6, and 7.

- Mitigation measures proposed to minimize the potentially significant effects. Since this is a programmatic EIS/EIR, site-specific actions are not evaluated. Accordingly, no specific mitigation measures are presented, but general mitigation strategies and a general mitigation monitoring plan are provided. Mitigation strategies can be found in the summaries and text for each environmental resource in Chapters 5, 6, and 7. The proposed NEPA/CEQA monitoring is presented in Chapter 9.



- Alternatives to the proposed action including the No Action (or "No Project") Alternative and the environmentally superior (or "environmentally preferable") alternative. Chapter 2 describes alternatives, and Section 2.3 discusses the environmentally superior alternative.

- Growth-inducing impacts of the proposed action. These impacts are discussed in Chapter 3 and addressed in the environmental resource categories in Chapters 5, 6, and 7.

- The relationship between local short-term uses of mankind's environment and the maintenance and enhancement of long-term productivity. This relationship is summarized in Chapter 3 and addressed in the environmental resource categories in Chapters 5, 6, and 7.

- Any significant irreversible environmental changes that would be involved in the proposed action should it be implemented. These changes are discussed in Chapter 3 and addressed in the environmental resource categories in Chapters 5, 6, and 7.

- Summary (with major conclusions, areas of controversy, and issues to be resolved). A summary is included in each impact analysis for all environmental resource categories.

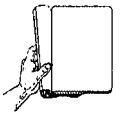
- Program description. The Program description is found in Chapter 1. This discussion includes the Program purpose and need, Program goals and objectives, Program solution principles, Program study area and geographic scope, and the next steps in the process.

4.3 ESTIMATED LAND USE CHANGES DUE TO THE PROGRAM

Because of the general and programmatic nature of this document, it is impossible to specifically define the land use changes that will result from implementing the Program. The extent and specific locations of the Program actions have yet to be decided. To evaluate the environmental consequences of Program actions at a programmatic level, it is necessary to estimate the amount of land that could be disturbed by Program actions. The Program identified the maximum ranges of acreage that could be affected by the various Program elements to give decision makers and the public a sense of the "worst-case" land use impact.

Although impacts in the range of these acreage estimates are theoretically possible, the affected acreage likely would be considerably less because these estimates do not include reductions in the land use changes that could take place based on measures that may be implemented in Phase III to avoid, minimize, or mitigate these changes.

Because the Ecosystem Restoration Program actions could affect the largest amount of land, particularly agricultural lands, information is offered to illustrate actions that could be taken during Phase III to minimize the extent of lands, particularly in the Delta, adversely affected by the Program. The environmental, economic, and social consequences of these proposed land use changes and other adverse and beneficial impacts associated with the Program can be found in Chapters 5, 6, and 7.



Estimated land use changes are presented here to provide a system-wide perspective regarding potential land use conversions and to reduce repetition in the document. These changes also are discussed in Chapters 5, 6, and 7 as appropriate.

Other Program elements most likely to influence land use changes are water quality, levee system integrity, storage, and conveyance. The Water Transfer Program may influence land use changes if transfers from agriculture to urban or environmental uses are facilitated by the program. The extent of these potential changes are not known at the present time; therefore, no estimates of land changes relating to these programs are presented. Water Use Efficiency and Watershed Program measures are not expected to directly affect current land uses; therefore, no estimates of land changes relating to these programs are presented.

4.3.1 ECOSYSTEM RESTORATION PROGRAM

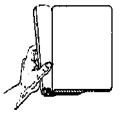
Table 4-2 summarizes the actions currently contemplated, along with estimates of the acreage that could be affected by each action.

Table 4-2. Estimate of Land Area Affected by the Ecosystem Restoration Program (in acres)

HABITAT TYPE	BAY REGION	DELTA REGION	SACRAMENTO RIVER REGION	SAN JOAQUIN RIVER REGION
Tidal perennial aquatic	1,500	7,000	0	0
Tidal perennial aquatic (shoals)	0	500	0	0
Nontidal perennial aquatic	1,600	2,600	0	0
Tidal sloughs	300-400	700-1,600	0	0
Midchannel islands	0	200-800	0	0
Fresh emergent wetland (tidal)	0	30,000-45,000	0	0
Fresh emergent wetland (nontidal)	0	17,000	0	0
Seasonal wetland	1,000-1,500	28,000	0	0
Riparian	200-300	1,200-1,900	3,600	5,400-5,900
Saline emergent wetland (tidal)	7,500-12,000	0	0	0
Stream meander corridor	0	0	15,000	1,000
Perennial grassland	5,000	4,000-6,000	0	0
Total acres	**17,100-22,300**	**91,200-110,400**	**18,600**	**6,400-6,900**

Note:
Ongoing Program refinement has shifted restoration acres among the regions and reduced the total acres required since publication of the June 1999 Draft Programmatic EIS/EIR.

The Ecosystem Restoration Program would coordinate and assist in restoration activities currently under way and future activities outside the Ecosystem Restoration Program that could lead to the habitat restoration goals identified in the program. For example, actions under the Central Valley Project Improvement Act and the Central Valley Habitat Joint Venture are designed to protect and restore significant areas of land in the Central Valley. To the extent that these activities and programs establish



habitat that is also proposed in the Ecosystem Restoration Program, the amount of land needed to achieve the Ecosystem Restoration Program goals would be reduced.

The Program would take a variety of steps to reduce effects on farmland, including:

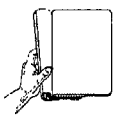
- Implementation of the Ecosystem Restoration Program would occur over many years. The implementation process would include extensive local community, landowner, and stakeholder involvement.
- The Program would obtain easements on existing farmland that would allow for continued farming with minor changes in agricultural practices, thus increasing the value of the crops to wildlife.
- Habitat restoration efforts would focus first on developing habitat on public land where appropriate.
- If no public land is available, restoration efforts would focus next on land acquired from willing sellers and that provides substantial benefits for ecological processes, habitat, or species.
- Where small parcels of land are needed for waterside habitat, acquisition efforts would seek out points of land on islands where the ratio of levee miles to acres farmed is high.
- Where possible, floodplain restoration efforts would include provisions for continued agricultural practices.

4.3.2 WATER QUALITY PROGRAM

Facilities to control and treat various discharge effluents would directly affect current land uses. The extent and locations of these facilities are unknown at this time; consequently, the acreage that could be affected cannot be forecast in a meaningful way. These facilities will need to be evaluated for environmental impacts when the facilities are being planned.

Land retirement is not a specific objective of the CALFED Water Quality Program. However, it is a tool available to help meet the program's water quality objectives in the San Joaquin Valley that are aimed at controlling degradation from selenium associated with agricultural drainage. Land retirement along the west side of the San Joaquin River watershed is included in the CALFED No Action Alternative to reflect actions planned by the federal government under the Central Valley Project Improvement Act (CVPIA). These actions would occur irrespective of the CALFED Program. As outlined in the Water Quality Program Plan, other water quality management tools will be used to their fullest extent before any land retirement is initiated under the CALFED Program. As outlined in the Water Quality Program Plan, CALFED initially will focus on implementing water quality management tools that will retain current agricultural lands in agricultural production. If the salinity objectives in the program plan are not met using those tools, non-sustainable measures such as land retirement could be initiated under the CALFED Program. The selected non-sustainable measures should retain much of the current agricultural lands in production.

Should land retirement still be deemed necessary, CALFED would consider implementing a program to retire lands in order to help meet water quality objectives for selenium under a tiered approach. Initially, up to 3,000 acres of land in the San Joaquin Valley with the greatest concentrations of selenium could be



retired. If that is insufficient, land retirement would be expanded up to a total of 37,000 acres with high selenium concentrations. These values are based on the report titled "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley," a collaboratively published report coordinated by Reclamation and published in September 1990. The report is commonly referred to as the "Rainbow Report."

The tiered approach to land retirement is intended to limit the need for land retirement to the least amount necessary in order to meet the water quality objectives.

4.3.3 LEVEE SYSTEM INTEGRITY PROGRAM

Levee restoration would cause both temporary and permanent land disturbance near existing levees. Land disturbed temporarily during construction would be restored through revegetation and likely would return to preconstruction conditions. These temporary losses are estimated at between 1,000 and 1,500 acres. Other land would be permanently affected by the larger footprint of the new levees. Levee reconstruction could require approximately 15,000 acres. About 625 of the 1,100 miles of Delta levees would be upgraded, and a 200-foot-wide piece of land is needed for each levee mile. The Program also projected that 100 miles of setback levees could be constructed, affecting an area 500 feet wide per levee mile. Subsidence control could affect about 14,000 acres. In total, an estimated range of 34,000-35,000 acres could be permanently affected by the Levee System Integrity Program. These estimates are the upper range of the possible acreage that could be affected. The Program will refine these estimates as the process continues.

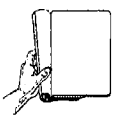
Suisun Marsh levee restoration also would result in land disturbance. Assuming a similar footprint as the Delta levees, restoration of the Suisun Marsh levees could affect from 5,000 to 5,600 acres. Affected land uses are primarily wildlife habitat.

4.3.4 STORAGE

Acreage permanently affected by constructing or modifying storage facilities would be determined by the number, size, and location of sites eventually selected for those facilities. A range of additional groundwater storage also is included in the alternatives. Table 4-3 shows preliminary calculations of land that could be affected by the footprint of new storage facilities. Several representative storage sites were examined to provide a better perspective on the potential magnitude of land use changes, as well as other storage-related consequences. Estimates do not include land that might be affected outside the reservoir footprint, such as water diversion structures, canals, pipes, and access roads. The actual areas and land uses that would be affected depend on the siting, design, and operation of the reservoir. This information will be developed in subsequent project-specific environmental documents.

The following sites were investigated as examples for preliminary land use change analysis in this document:

- Sites/Colusa and Thomes-Newville Reservoir sites were selected to represent surface water storage on Sacramento River tributaries. Assuming a storage capacity of 3 MAF, the potential land affected by a new reservoir could range from 16,700 acres (Thomes-Newville) to 29,600 acres (Sites/Colusa). This range is included in the Sacramento River Region in Table 4-3.



- The Montgomery Reservoir site was the representative example for surface water storage on San Joaquin River tributaries. Assuming a storage capacity of 500 thousand acre-feet (TAF), the land that would be affected by a new reservoir at this site was estimated at 8,050 acres. This value is included in the San Joaquin River Region in Table 4-3.

- Groundwater storage was estimated at 1,500 acres in both the Sacramento River and San Joaquin River Regions. These values are included in the respective regional areas in Table 4-3.

- The Los Vaqueros Reservoir site was the example for the surface water storage off-aqueduct option. Assuming a storage capacity of 1 MAF, the potential land affected by enlarging the existing reservoir was estimated at 7,000 acres. This value is included in the San Joaquin River Region in Table 4-3.

- Victoria, Bacon, Holland, and Woodward Islands were the example sites for the in-Delta storage. The islands occupy an area of 18,000-19,500 acres. It is estimated that a storage facility on these islands would affect approximately 15,000 acres. These values are included for the Delta Region in Table 4-3.

4.3.5 CONVEYANCE

The estimated amounts of land area (for example, agriculture, and fish and wildlife habitat) that would be affected by conveyance features are shown in Table 4-3. Additional lands may be necessary for new facilities and related infrastructure, such as access roads. Estimates do not include land that might be affected outside the reservoir site.

Table 4-3. Estimates of Land Area Affected by Storage and Conveyance (in acres)

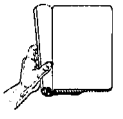
	DELTA REGION		SACRAMENTO RIVER REGION	SAN JOAQUIN RIVER REGION	ALL REGIONS
ALTERNATIVE	STORAGE [a,c]	CONVEYANCE	STORAGE [a]	STORAGE [a]	TOTAL
PPA [b]	0-15,000	100-4,500	0-32,000	0 to16,600	100-68,100
1	0-15,000	100-700	0-32,000	0 to16,600	100-64,300
2	0-15,000	4,000-4,500	0-32,000	0 to16,600	4,000-68,100
3	0-15,000	4,500-6,000	0-32,000	0 to16,600	4,500-69,600

Notes:
PPA = Preferred Program Alternative.

- Estimates assume that channel capacity is enlarged by using setback levees. For each configuration, the estimate of land area associated with conveyance changes is based on the following: operable barriers and channel modifications—100-700 acres; screened intake on the Sacramento River and north Delta channel modifications—3,500-3,800 acres; and isolated open channel (45 miles long and 1,000 feet wide)—4,000-5,000 acres. Range of storage is the same for all alternatives. The upper end of the range reflects the variation possible, depending on which size reservoir is eventually selected.

- Ongoing Program refinement has modified these estimates since publication of the June 1999 Draft Programmatic EIS/EIR.

[a] Estimates do not include lands that might be affected outside the reservoir site.
[b] The Preferred Program Alternative conveyance estimate ranges from without the diversion facility on the Sacramento River to including a facility.
[c] This figure, based on conjectural projects, could increase about 1,000 acres if the proposed Delta Wetlands Project, as currently configured, is approved, built, and used for CALFED purposes.



4.3.6 IMPORTANT FARMLAND

Program activities could affect lands designated as prime farmland, unique farmland, and farmland of statewide importance. Table 4-4 (at the end of the chapter) summarizes the acreages by farmland type that could be affected by the Program. Except as noted, the acreage estimates assume that all Program activities would occur on these three types of farmland.

In addition to the long-term land use changes, the Program expects that construction activities will result in temporary conversion of additional agricultural land. Mitigation necessary to offset impacts on wildlife as a result of implementing the levee system integrity, water quality, conveyance, and storage elements may also affect agricultural lands. These additional acres of agricultural land are included in the range of acres presented in Table 4-4.

The mitigation strategies presented in each environmental resource category are guidelines for formulating measures that may be chosen by CALFED agencies or other implementing agencies in second-tier environmental reviews, which will be completed before post-ROD project actions occur. Specific mitigation measures will depend on project location, site impacts, size of the project, and other variables that cannot be determined at a programmatic level. Mitigation measures will be included, if a significant impact is identified, in these second-tier environmental documents. Implementing some mitigation measures could result in additional environmental effects, as a result of the mitigation measures themselves. However, until site-specific projects are analyzed and specific mitigation measures are selected, it is not possible to identify these additional effects at this time. Mitigation measures for these potential secondary effects also will be addressed in second-tier environmental documentation.

The mitigation strategies are designed to reduce and mitigate the Program-wide impacts associated with conversion of agricultural land as the Program is implemented through tiered, second-level projects. As the Program is implemented, project-level mitigation measures will be included to address the impacts of conversion of agricultural lands, as applicable to the site-specific conditions of each project. Until it is known which sites will be subject to specific Program projects, and what the proposals for specific locations are, it is difficult to identify the most appropriate and effective mitigation measures. Not all mitigation measures will be applicable to all projects because site-specific projects will vary in purpose, location, timing, and scope.

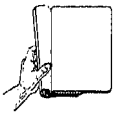


Table 4-4. Estimates of Important Farmland Potentially Converted by Program Elements (in acres)

		ECOSYSTEM RESTORATION PROGRAM [b]			LEVEE SYSTEM INTEGRITY PROGRAM [b,e]			STORAGE [b,c,g,h]			CONVEYANCE [b,e,f]			WATER QUALITY PROGRAM [a,b,d]	
ALTERNATIVE/REGION		P	S	U	P	S	U	P	S	U	P	S	U	0	TOTAL
PPA	Delta	85,800-101,600	3,200-6,500	1,400-3,500	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	100-3,800	0-200	0-500	0	124,500-166,100
	Sacramento River	21,700-28,800	3,300-3,900	600-1,300	0	0	0	0	0	0	0	0	0	0	25,600-34,000
	San Joaquin River	3,500-5,000	400-500	100-300	0	0	0	0	0	0	0	0	0	37,000	41,000-42,800
	Total	111,000-135,400	6,900-10,900	2,100-5,100	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	100-3,800	0-200	0-500	37,000	191,100-242,900
1	Delta	85,800-101,600	3,200-6,500	1,400-3,500	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	100-300	0-100	0	0	124,500-162,000
	Sacramento River	21,700-28,800	3,200-3,900	600-1,300	0	0	0	0	0	0	0	0	0	0	25,500-34,000
	San Joaquin River	3,500-5,000	400-500	100-300	0	0	0	0	0	0	0	0	0	37,000	41,000-42,800
	Total	111,000-135,400	6,900-10,900	2,100-5,100	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	100-300	0-100	0	37,000	191,100-238,800
2	Delta	85,800-101,600	3,200-6,500	1,400-3,500	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	3,500 3,800	100-200	400-500	0	128,400-166,100
	Sacramento River	21,700-28,800	3,200-3,900	600-1,300	0	0	0	0	0	0	0	0	0	0	25,500-34,000
	San Joaquin River	3,500-5,000	400-500	100-300	0	0	0	0	0	0	0	0	0	37,000	41,000-42,800
	Total	111,000-135,400	6,900-10,900	2,100-5,100	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	3,500-3,800	100-200	400-500	37,000	195,000-242,900
3	Delta	85,800-101,600	3,200-6,500	1,400-3,500	31,000	2,500-3,000	500-1,000	0-14,000	0-1,000	0	4,000-4,800	300-900	200-300	0	128,900-167,600
	Sacramento River	21,700-28,800	3,200-3,900	600-1,300	0	0	0	0	0	0	0	0	0	0	25,500-34,000
	San Joaquin River	3,500-5,000	400-500	100-300	0	0	0	0	0	0	0	0	0	37,000	41,000-42,800
	Total	**111,000-135,400**	**6,900-10,900**	**2,100-5,100**	**31,000**	**2,500-3,000**	**500-1,000**	**0-14,000**	**0-1,000**	**0**	**4,000-4,800**	**300-900**	**200-300**	**37,000**	**195,400-244,400**

Notes:

PPA = Preferred Program Alternative.

Types of Farmland

- Prime (P): Land with the best combination of physical and chemical features for the production of agricultural crops.
- Statewide importance (S): Land with a good combination of physical and chemical features for the production of agricultural crops.
- Unique (U): Land of lesser quality soils used for the production of the state's leading agricultural cash crops.

[a] Acreages of farmland of statewide importance cannot be accurately estimated at this time because mapping has not been completed in the San Joaquin River Region. It is possible that farmland of statewide importance would be affected by the Water Quality Program in the Grasslands area of the San Joaquin River Region.

[b] Estimates assume that all land conversion occurs on lands currently in use for agricultural purposes.

[c] Outside the Delta, estimates assume that potential storage reservoirs sites are typically foothill grasslands and do not contain significant amounts of important farmland; small amounts of important farmland could be affected if reservoirs are sited in valleys containing alluvial deposits that support important agricultural farmland.

[d] Total includes maximum acreage potentially affected by the Water Quality Program.

[e] Estimates assume that all Delta channel capacity is enlarged by constructing setback levees.

[f] The Preferred Program Alternative estimate ranges from without the diversion facility on the Sacramento River to including a facility.

[g] In-Delta storage, based on conjectural projects, could increase by about 1,000 acres if the proposed Delta Wetlands Project, as currently configured, is approved, built, and used for CALFED purposes.

[h] Estimates do not include land that might be affected outside the reservoir footprint, such as access roads and appurtenant project facilities.

Modifications to acreage estimates presented in Tables 4-2 and 4-3 are not included in this table. In comparison to the June 1999 Draft Programmatic EIS/EIR, total acreage of important farmlands affected by the Ecosystem Restoration Program has been reduced by approximately 2% in all alternatives; the acreage necessary for Delta conveyance features for Alternative 1 has increased by less than 1%. These minor changes do not appreciably alter the impacts on important farmland that were presented in the June 1999 Draft Programmatic EIS/EIR. Accordingly, the description of impacts in this table and in the many resource sections remains the same as those in the June 1999 Draft Programmatic EIS/EIR.