4. ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

This chapter evaluates the environmental consequences of the no action, proposed action, and alternative action for each resource area and concern described in Chapter 3, Affected Environment. The proposed action of meeting flow objectives for the San Joaquin River system through the implementation of the San Joaquin River Agreement (SJRA alternative) is compared with the No Action alternative. Finally, the alternative action of the Water Right Priority System is discussed in comparison with no action. The terms "effects" and "impacts" are synonymous.

4.1 INTRODUCTION

4.1.1 Scope of Analysis

Chapter 3 described the environmental setting for the following environmental resources and concerns that were determined to be potentially affected by the alternatives:

- Surface Water
- Groundwater
- Terrestrial Resources (Vegetation and Wildlife)
- Aquatic Resources
- Land Use
- Cultural Resources
- Recreation
- Energy Resources
- Indian Trust Assets
- Environmental Justice

These resources are described in this action-specific or project EIS/EIR based on a 1998 Environmental Assessment/Initial Study (EA/IS) for a one-year water acquisition by the Bureau of Reclamation (Reclamation) from the San Joaquin River Group Authority's (Authority's) willing sellers (USBR 1997c). The 1998 EA/IS concluded that these concerns were appropriate for an in depth evaluation of additional stream flows in the San Joaquin River measured at Vernalis. The public scoping process for this focused EIS/EIR confirmed that resource issues were limited to these ten that meet NEPA and CEQA requirements (see Section 5.1). As a result, impacts on resources such as climate and air quality, soils and geology, noise, aesthetics, transportation/circulation, growth inducement, and public services are not evaluated based on a high probability of no impact. These resource areas are unlikely to be affected by an instream flow project that does not involve the construction of major new facilities. Should any of the willing sellers construct new canals or other facilities to store or convey water, these projects would be subject to independent NEPA/CEQA analyses.

4.1.2 Determination of Impact and Mitigation

The environmental consequences of the alternatives are classified into the following impact categories:

- **Significant.** Significant adverse environmental impacts are those that can be clearly identified as significant based on the criteria identified for each resource area. There is no mitigation available to reduce the impact to less than significant.

- **Potentially Significant.** Adverse impacts have been identified that have the potential to be significant. In the absence of sufficient information to determine that the potential impact is less than significant, the impact is treated as significant. Also, if the potentially significant impact cannot be mitigated to a less-than-significant level, then it is considered significant.

- **Less-Than-Significant.** This type of adverse impact is determined to be small or insignificant based on the criteria identified for each resource area. This type of environmental effect is usually short term or measurably small. It may or may not contribute to a cumulative impact over the long term.

- **No Impact.** Using the criteria for determining significance of impact, this category means that no adverse impact can be identified. There is no adverse physical or social change that can be determined based on available information.

- **Beneficial.** The environmental consequences are positive or otherwise beneficial to the resource. A beneficial impact may be further described as a significant beneficial impact when the magnitude of the positive effect is large.

This classification system is based on criteria contained in the CEQA Guidelines (OPR 1995) and others explained in the first section under each resource category. Both qualitative and quantitative thresholds of significance are used, depending on the resource and the availability of measurable standards.

Adverse and beneficial impacts can be direct (primary), indirect (secondary), short-term, long-term, and/or cumulative. Cumulative impacts are those that are not significant when considered alone but when combined with other similar actions may have a cumulative effect that is significant. Cumulative as well as unavoidable impacts, irreversible commitments of resources, and the relationship between short-term uses and long-term productivity are described in Chapter 4 in summary sections following the impact evaluations for each resource area.

Mitigation measures to reduce significant adverse impacts to a less-than-significant level are specific, feasible actions that will improve or mollify adverse conditions. A mitigation measure is feasible if

it can be accomplished in a successful manner within a reasonable period of time, taking into consideration economic, environmental, legal, social, and technological factors.

According to Section 15370 of the CEQA EIR Guidelines, the term "mitigation" includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree of magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impacts by replacing or providing substitute resources or environments.

Impacts that are less than significant or not significant (no impact) do not require mitigation. Impacts that are potentially significant or significant that can be mitigated, and the feasible mitigation measures, are described in Appendix G, Mitigation Monitoring Program.

4.1.3 Water Uses Potentially Affected

The subsequent analyses of adverse impacts of the proposed action consider the water uses that would be potentially affected by the proposed action to implement the flows contained in the SJRA The SJRA provides for a redirection of up to 137,500 acre-feet of water annually from existing uses to instream flows for fish and related environmental benefits (110,000 acre-feet for spring and 12,500 acre-feet for fall and 15,000 acre-feet available at any time during the year). This potential redirection is shown in Table 4.1-1 with the amounts shown as a range of outcomes. The subsequent analyses of impacts to surface water, groundwater, and land use/agriculture rely on this distribution of affected uses.

Table 4.1-1: WATER USES POTENTIALLY AFFECTED BY PROPOSED PROJECT (TAF)

Water Uses	Exchange Contractors	OID[1]	SSJID	MID	TID	Merced ID[2]	All
Irrigation	0	0-26	0-11	0	0	0-67.5[3]	104.5
Municipal	0	0	0	0	0	0	0
Carryover Storage/Conservation[4]	0	0-26	0-11	0-11	0-11	0-67.5[5]	126.5
Surface Runoff	0-11	0	0	0	0	0	0-11
Return Flows	0-11	0-15	0	0	0	0	0-26
Groundwater Recharge	0	0-15	0	0	0	0-67.5[6]	0-82.5
Range of Total Available Water	**0-11.0**	**0-26.0**	**0-11.0**	**0-11.0**	**0-11.0**	**0-67.5**	**0-137.5**

[1]Water includes 15,000 acre-feet for release at any time during the year. The additional water is to be used for ramping around the spring or October pulse flows or at other times to support spawning, to control water temperature, or to meet other needs consistent with the New Melones Interim Plan of Operation. See Section 2.1.3.3.
[2]Water includes 12,500 acre-feet for delivery in October for fall attraction flow.
[3]Potential impact in only the most severe drought years. Reduced deliveries may occur in nine out of 71 years, based on historical hydrology. The proposed conjunctive use project is expected to offset water supply impacts.
[4]OID and SSJID have a conservation account that is tightly regulated on when water can be used.
[5]During some years, the maximum annual quantity may come from storage releases and, therefore, result in a reduction in carryover storage.
[6]Merced ID is to implement a conjunctive use project to provide dry year supplies and sustain groundwater levels to 1992 levels.

4.1.4 Model Results Used in Analyses

The impact analysis of the proposed action is based upon the Hydrologic Analysis–San Joaquin River Agreement (Appendix A) specifically conducted for this EIR/EIS. This study utilized several operation simulation models developed by Reclamation: Projects Simulation Model (PROSIM) representing CVP/SWP operations and West Side deliveries; San Joaquin Area Simulation Model (SANJASM) representing Merced and Tuolumne operations, West Side streams, West Side return flows, flow above the Stanislaus, and water quality above the Stanislaus; and, the Stanislaus Operations Model (STANMODAM) which is a spreadsheet model representing Stanislaus operations under assumptions of Reclamation's Interim Plan of Operation for New Melones, and Vernalis flow and water quality. To evaluate the effects of the proposed action across a range of hydrologic events, a long-term 71-year (1922 through 1992) hydrological sequence was simulated. Within that period of record various combinations of hydrologic events occurred ranging from periods of extended drought to floods. The SJRA is a twelve-year proposed action, and it is not possible to predict the hydrologic conditions which will occur over the proposed life of the project, 1999-2010. However, by analyzing a long term record containing a historical sequence of water year types, it is possible to illustrate how the proposed action would perform over numerous different sequences of hydrologic conditions.

A No Action alternative was also analyzed to produce a basis for comparing the effects of implementing the proposed action (SJRA). The full set of detailed assumptions of the No Action setting are provided in Appendix A. The major assumptions are:

- New Melones Reservoir is operated consistent with the 1997 Interim Plan of Operation.
- The Merced and Tuolumne River reservoir systems are modeled to operate to meet diversion demands and minimum instream flow requirements.
- Implementation of the SWRCB's 1995 WQCP is accomplished through operations of the SWP and CVP.
- Delta smelt and winter run chinook salmon Biological Opinions constraining operations of the SWP and CVP.

These No Action (base case) model settings result in San Joaquin River flow conditions at Vernalis that define the "existing flow" and operational conditions for the SJRA.

The impacts of implementing the Water Right Priority System alternative were determined by analyzing the SWRCB Draft EIR/EIS (1998). The Board utilized the Department of Water Resources Project Simulation Model (DWRSIM) to determine the operational changes required in the San Joaquin Basin to meet the Vernalis flow objectives of the 1995 WQCP. Similar to the above analysis, the SWRCB used an historic hydrology (1922 through 1994) to characterize the impacts across a range of hydrologic conditions. The base case utilized to determine the magnitude and direction of change upon implementation of their alternatives was different than the base case used for analysis of the proposed project (SJRA). The SWRCB assumed, as a no action alternative, that the regulatory environment would revert back to a condition where the SWP and CVP would be solely responsible for meeting pre-Bay/Delta Plan flow objectives (required by D-1485 and D-1422), that is, no implementation of either the New Melones Interim Plan of Operation for achieving the Vernalis flow or the export reduction standards required by the 1995 WQCP to protect fishery and water quality beneficial uses. The SWRCB, however, did simulate an alternative (Alternative 2) in which they assumed that the SWP and the CVP would be solely responsible for meeting the flow and export requirements called for in the 1995 WQCP. In using the SWRCB analysis of the impacts associated with implementing the Water Right Priority System, Alternative 2 was used as the best approximation of "no action" or base line condition.