EXECUTIVE SUMMARY

INTRODUCTION

California has historically been legally diverting more than its normal year apportionment of 4.4 million acre-feet (MAF) of Colorado River water. Prior to 1996, California's demands in excess of 4.4 million acre-feet per year (MAFY) were met solely by diverting unused apportionments of other Lower Division States (Arizona and Nevada) that were made available by the Secretary of the Interior (Secretary). Since 1996, California also has utilized surplus water made available by Secretarial determination. The other Lower Division States are, however, approaching full utilization of their apportionments, and declared surpluses of Colorado River water are expected to diminish in future years. California, therefore, needs to reduce its consumptive use of Colorado River water to its 4.4 MAF apportionment in normal years. In a major step toward achieving this goal, the Colorado River Board of California (CRB) developed California's draft Colorado River Water Use Plan (California Plan). The California water agencies consisting of The Metropolitan Water District of Southern California (MWD), Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), and San Diego County Water Authority (SDCWA) negotiated the Key Terms for Quantification Settlement (Key Terms), and developed a draft Quantification Settlement Agreement (QSA). The QSA, which is described in more detail below and in Chapter 2, establishes a framework of conservation measures and water transfers between the participating agencies for a period of up to 75 years. These provide an important mechanism for California to reduce its diversions of Colorado River water in normal years to its 4.4 MAF apportionment.

PURPOSE AND NEED

The Secretary, pursuant to the Boulder Canyon Project Act (BCPA) and *Arizona v. California*, 1964 Supreme Court Decree (Decree), proposes to take Federal actions necessary to support the implementation of the QSA. The purpose of the Federal action is to facilitate implementation of the QSA, which incorporates contractual agreements necessary for California to reduce its use of Colorado River water. The need for the Federal action is to assist California's efforts to reduce its use of Colorado River water to a 4.4 MAF apportionment in a normal year. This reduction in California's use of Colorado River water would benefit the entire Colorado River Basin.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This Environmental Impact Statement (EIS) describes the potential environmental impacts of the proposed action, which is the execution of an Implementation Agreement (IA) that would commit the Secretary to making Colorado River water deliveries in accordance with the terms and conditions of the IA to enable implementation of the QSA, and related accounting and environmental actions. The three major components of the proposed action are as follows:

- Execution of the IA, wherein the Secretary agrees to changes in the amount and/or location of deliveries of Colorado River water that are necessary to implement the QSA.

- Adoption of an Inadvertent Overrun and Payback Policy (IOP), which establishes requirements for payback of inadvertent overuse of Colorado River water by Colorado River water users in the Lower Division States. The IOP is a condition precedent to the execution of the IA and QSA and must be in place by the time these agreements go into effect.

- Implementation of biological conservation measures to offset potential impacts from the proposed action that could occur to federally listed fish and wildlife species or their associated critical habitats within the historic floodplain of the Colorado River between Parker Dam and Imperial Dam. These measures were developed and agreed to by the United States Bureau of Reclamation (Reclamation) and the United States Fish and Wildlife Service (FWS) in response to Reclamation's August 2000 *Biological Assessment for Proposed Interim Surplus Criteria, Secretarial Implementation Agreements for California Water Plan Components and Conservation Measures on the Lower Colorado River (Lake Mead to the Southerly International Boundary)* (BA) and were incorporated into the January 2001 *Biological Opinion for Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary Arizona, California, and Nevada* (BO).

Execution of the Implementation Agreement

The IA component of the proposed action contains terms and conditions pertaining to delivery of Colorado River water, which enable implementation of the QSA. Execution of the IA reflects the Secretary's approval of the QSA. For purposes of the analysis in this EIS, the IA includes all of the components of the QSA that relate to water transfers and changes in delivery of Colorado River water.

The QSA is an agreement among CVWD, IID, and MWD to budget their portion of California's apportionment of Colorado River water among themselves, and to make available water conserved in the IID service area to SDCWA (these water agencies are collectively referred to as the participating agencies). The QSA quantifies, by agreement, the amount of Colorado River water available to the participating agencies and calls for specific, changed distribution of that water among the agencies for the next 75 years. This is referred to as the "quantification period" and extends for up to 75 years, from 2002 to 2077. The QSA is a major component of the California Plan (described in section 1.5) and is part of the means by which California would reduce its Colorado River water consumptive use to 4.4 MAF in a normal year. By approving the IA, the Secretary would agree to make Colorado River water deliveries to the participating agencies to implement this changed distribution. The agencies' service areas, as well as the affected portion of the Colorado River, are shown on the project location map (Figure 2.2-1). Table 2.2-1 lists the Federal actions associated with the QSA components and the various NEPA and/or CEQA documents that have been or are being prepared to address impacts of these components.

Implementation of the IA and QSA would not affect the delivery, distribution, and/or use of Colorado River water by the States of Arizona and Nevada; nor would the IA and QSA affect the delivery, distribution, and/or use of Colorado River water by the Upper Division States. Also, the IA and QSA would not affect Colorado River water deliveries to Mexico under the United States–Mexico Water Treaty of 1944 and other applicable agreements and would not affect the delivery, distribution, and/or use of Colorado River water within Mexico. Within the State of California, the IA and QSA would only affect the delivery, distribution, and/or use of Colorado River water by the participating agencies (CVWD, IID, MWD, and SDCWA). The IA and QSA would not affect the delivery, distribution, and/or use of Colorado River water by other agencies within California that hold rights to Colorado River water under the Seven Party Agreement (i.e., Priorities 1, 2, 3b, 6b, and 7); nor would the IA and QSA affect the delivery, distribution, and/or use of Colorado River water by any present perfected right (PPR) holders (including PPR holders in the States of Arizona and Nevada) as identified in the Decree, and supplemental Decrees.

Adoption of an Inadvertent Overrun and Payback Policy

The IOP component of the proposed action includes adoption of a policy that would identify inadvertent overruns of Colorado River water, establish procedures that account for inadvertent overruns, and define subsequent payback requirements. The IOP would not be materially modified for a 30-year period. The IOP is a condition precedent to the IA and QSA; that is, the IOP must be in place prior to implementation of the IA and QSA. The IOP would be applicable to all lower Basin States' users with quantified entitlements but would not be applicable to Mexico. The complete text of the proposed IOP policy is included as Appendix I.

An inadvertent overrun is defined as Colorado River water that is diverted, pumped, or received by an entitlement holder in excess of the water user's entitlement for that year. The overrun is termed inadvertent because it is deemed to be beyond the control of the water user. The IOP applies to all quantified Colorado River water entitlements in the Lower Basin and can only be applied to quantified consumptive use entitlements or entitlements that would take the remaining quantity of a State's apportionment. A procedure has not been established for applying the IOP to unquantified Colorado River water entitlements since entitlements, that are not quantified, would have no baseline from which to make a determination that an overage occurred. (Unquantified Colorado River water entitlements are entitlements that specify the diversion of Colorado River water for irrigation of a certain acreage or specific area of land.)

Under the IOP, payback would be required to begin in the calendar year that immediately follows the release date of the Decree Accounting Record that reports inadvertent overruns for a Colorado River water user. Prior to the beginning of the calendar year, the user's water order, along with the payback plan, and the user's existing Reclamation-approved conservation plan would be submitted to Reclamation for review and approval within the normal 43 CFR 417 process. Reclamation would review a user's payback plan solely to assure that the plan would adequately result in water savings equal to their payback requirement. In their payback plan, the user would be required to demonstrate that the extra-ordinary measures are not part of any on-going measures intended to reduce use for a transfer. Under the 43 CFR 417 process, Reclamation would also determine the user's adjusted entitlement (entitlement - transfers - payback requirement) and require a water order that is consistent with the adjusted entitlement.

The IOP includes the following provisions:

- Payback must be made only from water management measures that are above and beyond the normal consumptive use of water; actions must be taken to conserve water that otherwise would not return to the mainstream of the Colorado River and be available for beneficial consumptive use in the United States or to satisfy the United States–Mexico Water Treaty of 1944 obligation.

- Maximum cumulative inadvertent overrun accounts for individual entitlement holders are 10 percent of an entitlement holder's normal year consumptive use entitlement.

- The number of years within which an overrun, calculated from consumptive uses reported in final Decree Accounting Records, must be paid back, and the minimum payback required for each year shall be as follows:

  – In a year in which the Secretary makes a flood control release[1] or a space building release[2], any accumulated amount in the overrun account would be forgiven.

  – If the Secretary has declared a 70R[3] surplus in the Annual Operating Plan, any payback obligation would be deferred at the entitlement holder's option.

  – When Lake Mead's elevation is between the elevation for a 70R surplus declaration and elevation 1,125 feet above mean sea level (msl) on January 1 of the first year of payback, the payback obligation must be paid back in full within 3 years. The minimum payback the first year would be the greater of 20 percent of the individual entitlement holder's maximum allowable cumulative overrun account amount, or 33.3 percent of the total account balance.

  – When Lake Mead's elevation is at or below elevation 1,125 feet above msl on January 1 of the first year of payback, the total account balance must be paid back in full in that calendar year.

Implementation of Biological Conservation Measures

This component of the proposed action involves implementation of the biological conservation measures identified in the BO. They were developed to fully compensate for impacts of the changes in point of delivery of Colorado River water that would occur under the IA.[4] This EIS addresses these measures programmatically. As detailed plans are developed and specific land disturbing activities are identified, Reclamation will determine and carry out supplemental NEPA compliance evaluations, as appropriate. The conservation measures related to the IA water transfers consist of the following:

1. Reclamation would stock 20,000 razorback suckers, 25 centimeters (cm) or greater in length, into the Colorado River between Parker and Imperial Dams. This would be a continuation of present efforts and would bring the total number of razorbacks of 25 cm

1. Flood control release is a release of water from Lake Mead for the purpose of meeting specific criteria as specified by the U.S. Army Corps of Engineers.
2. Space building release is a release of water from Lake Mead for the purpose of obtaining the required August 1 to January 1 available flood control storage space in Lake Mead as specified by the U.S. Army Corps of Engineers.
3. The "R" Strategy is an operating strategy for distributing surplus water and avoiding spills. The R strategy assumes a particular percentile historical runoff, along with a normal year, or 7.5 MAF delivery to Lower Division States, for the next year. Applying these values to current reservoir storage, the projected reservoir storage at the end of next year is calculated. If the calculated space available at the end of next year is less than the space required by flood control criteria, then a surplus condition is determined to exist.
4. The conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAFY while IA related changes in points of delivery may range up to 388 KAFY.

or greater in length stocked below Parker Dam to 70,000. This would be completed by 2006.

2. Reclamation would restore or create 44 acres of backwaters along the Colorado River between Parker and Imperial Dams. This effort could include restoring existing decadent backwaters for which no on-going effort provides funding or responsibility for restoration, or the creation of new backwaters where water availability, access, and other considerations can be met. Maintenance of these backwaters for native fish and wildlife would be ensured for the life of the water transfers. This would be completed within 5 years of the first water transfers under the IA (excluding the on-going water transfer under the IID/MWD 1988 Agreement and subsequent agreements).

3. Reclamation would provide $50,000 in funding for the capture of wild-born or first generation (F1) bonytails from Lake Mohave to be incorporated into the broodstock for this species and/or to support rearing efforts at Achii Hanyo, a satellite rearing facility of Willow Beach National Fish Hatchery. These efforts would be funded for 5 years.

4. A two-tiered conservation plan has been developed to minimize potential impacts to occupied willow flycatcher habitat that could result due to reduced flows on the Colorado River between Parker and Imperial Dams as water transfers and associated changes in point of delivery are implemented. The details of the Plan may be found below, and in the BO in Appendix E of this EIS.

ALTERNATIVES CONSIDERED

Implementation Agreement Alternatives

Because the purpose of the proposed action is to provide Federal approval of an agreement negotiated among the California parties, no other action alternatives are being considered. The QSA is a consensual agreement among three parties (CVWD, IID, and MWD) that resolves long-standing disputes regarding the priority, use, and transferability of Colorado River water. The proposed IA reflects that consensual agreement. The IA and QSA have been developed in response to the Secretary's 1996 statement that California must implement a strategy to enable the State to limit its use of Colorado River water to 4.4 MAF during a normal year or develop the means to meet its water needs from sources that do not jeopardize the delivery of Colorado River water to other States. Development of a strategy to reduce California's diversions of Colorado River water is considered by the Secretary to be a prerequisite for Secretarial approval of any further cooperative Colorado River water transfers among California agencies. The other Colorado River Basin States are also aware of the implications of the IA and QSA, and are very interested in and supportive of California's progress in reducing its Colorado River water diversions.

Inadvertent Overrun Policy Alternatives

Many alternative concepts and issues were considered in the development of the proposed IOP. Much interest and many ideas were identified during the scoping process and in response to the draft policy published in the Federal Register. As a result of considering public comment, one additional IOP alternative has been developed, and is considered, along with the proposed action, in this EIS.

No Forgiveness During Flood Releases Alternative

The proposed IOP contains a provision that in a year during which the Secretary makes a flood control release or a space building release, any accumulated amount in an overrun account would be forgiven. The No-Forgiveness Alternative would eliminate that provision. Under this alternative, during a flood control or space building release year, the overrun account would be deferred, but not forgiven. Payback would resume in the next year when such releases are not scheduled. All other provisions would be the same as the proposed IOP.

Alternative Biological Conservation Measures

No alternatives to the biological conservation measures identified in the BO are considered in this EIS. These conservation measures, which were included by Reclamation in its BA, would be implemented by Reclamation as specified in the BO. If Reclamation were unable to implement these measures as proposed, reinitiated consultation with FWS would be required.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the IA, IOP, and the biological conservation measures would not be implemented.

No Action for Implementation Agreement

Execution of the IA commits the Secretary to make Colorado River water deliveries to the participating agencies according to the terms and conditions of the IA to enable implementation of the QSA; execution of the IA is a condition precedent to the QSA. Therefore, under the No-Action Alternative, the QSA also would not be implemented. The Secretary would continue to make deliveries of Colorado River water subject to the Law of the River, including the existing priority system, Section 5 contracts, and determinations identified in the ISG ROD and 43 CFR 417. Because the QSA components are interdependent and represent a negotiated compromise of differing agency positions, under the No-Action Alternative it is assumed that none of the QSA components would be jointly and consensually approved, constructed, or implemented by CVWD, IID, and MWD.

Significant unresolved issues would remain regarding how California would divide Colorado River water among the participating agencies so as to limit the State's normal year consumptive use of Colorado River water to 4.4 MAFY. Because Colorado River water diverted by MWD, IID, and CVWD cannot return to the mainstream after it is conveyed away from the river, consumptive use must be reduced by limiting diversions by those three agencies. This would involve a reduction of approximately 600 KAFY from the 1990 to 1999 average Colorado River water diversion for the State of California, as required by the Secretary (pursuant to the Decree, and the Long-Range Operation of Colorado River Reservoirs (LROC), and in accordance with the California Limitation Act). Specific implications of the No-Action Alternative are as follows:

- The IID/MWD 1988 Agreement, IID/MWD/PVID/CVWD 1989 Approval Agreement, and MWD/CVWD 1989 Agreement to Supplement Approval Agreement, which have been implemented, would continue;
- There would be no consensual implementation of the new, cooperative, voluntary management plans or programs for water conservation, exchanges or transfers among the parties to the IA, and additional funding to support further agricultural conservation would be subject to pending disputes;
- The structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the All-American Canal (AAC) and the Coachella Canal, could lose $200 million in State funding and may not be implemented; therefore, there may not be water available from canal lining projects to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act;
- There would be no consensual agreement between CVWD, IID, and MWD to forego use of water to permit the Secretary to satisfy the water demands of holders of Miscellaneous and Federal PPRs not within the Priorities contained in the Seven Party Agreement, up to the amount of each PPR, whereby satisfaction of PPRs would otherwise reduce the amount of water available to the lowest priority user (which, in a normal year, would be MWD); and,
- In the event that California contractors have not executed the QSA by December 31, 2002, the Interim Surplus determinations identified in the Interim Surplus Guidelines (ISG) Record of Decision (ROD) will be suspended and surplus determinations will be based upon the 70R Strategy, until such time California completes all actions and complies with reductions in water use identified in Section 5(c) of the ISG ROD. Section 5(c) establishes benchmark quantities and dates for reductions in California agricultural usage, and states that in the event California has not reduced its use to meet the benchmark quantities, the Interim Surplus determinations identified in the ISG ROD will be suspended and determinations will be based on the 70R strategy. Section 5(c) also provides conditions regarding reinstatement of ISG surplus determinations if missed benchmarks are later met.

No Action for Inadvertent Overrun Policy

Under the No-Action Alternative, the IOP would not be adopted, and the Secretary would enforce the obligations under the Decree to ensure that no Colorado River water user exceeds its entitlement amount. Diversions of Colorado River water are reported monthly for most water users, and Reclamation releases a monthly tabulation of the cumulative years diversions and return flows as discussed in section 1.2.3. Under the No-Action Alternative, Reclamation would enforce its obligations under the Decree, which may include reducing deliveries for those water users that would overrun based on diversions to date and projected diversions for the remainder of the year, and/or stopping deliveries for water users that are at their entitlement amount. However, due to the nature of measurement, reporting, and accounting practices, there would continue to be some level of inadvertent overruns. The Secretary may determine at a future date that there is a need for a policy to assure these are addressed in a consistent fashion.

No Action for Biological Conservation Measures

Under the No-Action Alternative, the applicable biological conservation measures identified in the BO would not be implemented. Reconsultation with FWS would be required to effectuate any additional water transfers.

PUBLIC INVOLVEMENT AND SCOPING PROCESS

On January 18, 2001, Reclamation published a Federal Register Notice of Public Comment Period on a proposed policy that would identify inadvertent overruns, and define subsequent payback requirements to the Colorado River mainstream. On March 9, 2001, a second Federal Register notice was published, extending the public comment period to April 10, 2001. Sixteen letters of comment were received by Reclamation on the proposed IOP. Also on March 9, 2001, Reclamation published in the Federal Register a Notice of Intent (NOI) to prepare an EIS and initiation of scoping process for the IA, IOP, and implementation of the biological conservation measures. The scoping comment period also ended April 10, 2001. Six letters of comment were received in response to the NOI. Comments addressed a number of issues including the following:

- Project description (the need for flexibility to accommodate future shifts in water policy and consideration of in-stream and other public interest beneficial uses in long-term water resource planning; the need for detailed descriptions of implementation, monitoring, and enforcement strategies).
- EIS content (the geographic scope of the analysis and the need to identify the relationship of the proposed action to all major proposed and related Federal and State actions along the lower portion of the Colorado River; specific resources to be analyzed; the need for a detailed mitigation plan; the need to include sufficient information and analysis from documents incorporated by reference; the need for an appropriate baseline and no-action scenario).
- Expansion of the range of project alternatives.
- The need for compliance with the Endangered Species Act.

On April 26, 2001, a separate letter was sent to 55 Indian Tribal representatives, initiating government-to-government coordination pursuant to CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508, § 1501.7); the National Historic Preservation Act (§ 101[d][2]) (16 U.S.C. § 470f), the new Section 106 regulations, "Protection of Historic Properties" (36 CFR Part 800.2[c][2]); and Executive Order 13175 of November 6, 2000, pertaining to consultation and coordination with Indian tribal governments. The only comment letter received in response to this letter was from the Fort Mojave Indian Tribe, which requested that it be placed on the distribution list for the EIS. No concerns or issues were raised in this letter.

On February 15, 2001, Reclamation staff met with members of seven interested environmental groups at their request to discuss the proposed IOP. In addition, informal discussions and a meeting on March 22, 2001, were held with representatives of the Colorado River Basin States to discuss the technical details of the proposed IOP. A conference call to discuss these technical aspects was held with the same seven environmental groups on April 3, 2001. Coordination with the FWS pursuant to the Fish and Wildlife Coordination Act was initiated in April 2001, and several meetings and informal discussions were carried out. Extensive coordination with the FWS had been previously conducted pursuant to the Section 7 consultation on ISG and the IA. In August and September 2001, Reclamation met with the United States Bureau of Indian Affairs (BIA) and Colorado River Indian Tribes (CRIT) to review the impacts to power generation from the proposed water transfers. In addition, numerous meetings were held with the four affected California agencies regarding coordination of NEPA and CEQA compliance, and on July 26, 2001, Reclamation met with U.S. Environmental Protection Agency (EPA) staff to provide an overview of the proposed action. On November 7, 2001, Reclamation met with the Torres Martinez Band of Desert Cahuilla Indians to discuss potential impacts to the Salton Sea.

A scoping summary report was prepared to provide a synopsis of the scoping process conducted for the proposed action. The scoping summary report identifies efforts made to notify interested agencies, organizations, and individuals about the proposed action and to obtain input from those entities regarding the range of alternatives to be evaluated and the issues to be addressed in the EIS. The report also presents the major points made in the public comments received during the scoping process. The scoping summary report is available on Reclamation's Lower Colorado River Operations website at http://www.lc.usbr.gov.

An NOA was filed with the EPA on January 4, 2002, and was published in the *Federal Register* on January 15, 2002, for the draft EIS. The NOA effectively initiated a 60-day public review of the draft EIS. Reclamation agreed to extend the public review period by 14 days. The NOA for the public review extension was published in the *Federal Register* on March 15, 2002. Public hearings were held in Blythe, California; Henderson, Nevada; and Los Angeles, California on February 5, 6, and 7, 2002, respectively. Forty-one people attended the public hearing in Blythe, 14 in Henderson, and six in Los Angeles. Issues of concern presented during the public hearings included confusion over the project description, the process of the IOP payback, potential impacts to biological resources, and the water agreement between the U.S. and Mexico. The public comment review period ended on March 26, 2002. Comment letters received during the public review period and responses to those comments are provided in Chapter 11 of this EIS.

Summary of Potential Impacts

The potential impacts of the execution of the IA, adoption of the IOP, and implementation of biological conservation measures are evaluated for the following resources in this EIS: Hydrology/Water Quality/Water Supply, Biological Resources, Hydroelectric Power, Land Use, Recreational Resources, Agricultural Resources, Socioeconomics, Environmental Justice, Cultural Resources, Tribal Resources, Air Quality, and Transboundary Impacts. Based on a detailed resource-specific analysis, Reclamation has determined that implementation of the proposed action would result in negligible impacts to the following resource areas: geology, soils and mineral resources, noise, aesthetics, and public services. Therefore, these resource areas are not specifically addressed in this EIS. However, to the extent that an aspect of any of these resource areas may impact another resource, discussion has been incorporated.

Table ES-1 summarizes, by resource area, the potential impacts for each component of the proposed action.

Table

ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures

(29 pages)

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APPENDICES

Note: All appendices will be provided in Volume II of this FEIS.

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

California has historically been legally diverting more than its normal year apportionment of 4.4 million acre-feet (MAF) of Colorado River water. Prior to 1996, California's demands in excess of 4.4 million acre-feet per year (MAFY) were met solely by diverting unused apportionments of other Lower Division States (Arizona and Nevada) that were made available by the Secretary of the Interior (Secretary). Since 1996, California also has utilized surplus water made available by Secretarial determination. The other Lower Division States are, however, approaching full utilization of their apportionments, and declared surpluses of Colorado River water are expected to diminish in future years. California, therefore, needs to reduce its consumptive use of Colorado River water to its 4.4 MAF apportionment in normal years. In a major step toward achieving this goal, the Colorado River Board of California (CRB) developed California's draft Colorado River Water Use Plan (California Plan). The California water agencies consisting of The Metropolitan Water District of Southern California (MWD), Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), and San Diego County Water Authority (SDCWA) negotiated the Key Terms for Quantification Settlement (Key Terms), and developed a draft Quantification Settlement Agreement (QSA). The QSA, which is described in more detail below and in Chapter 2, establishes a framework of conservation measures and water transfers between the participating agencies for a period of up to 75 years. These provide an important mechanism for California to reduce its diversions of Colorado River water in normal years to its 4.4 MAF apportionment.

This Environmental Impact Statement (EIS) describes the potential environmental impacts of the proposed action, which is the execution of an Implementation Agreement (IA) that would commit the Secretary to making Colorado River water deliveries in accordance with the terms and conditions of the IA to enable implementation of the QSA, and related accounting and environmental actions. The three major components of the proposed action include the following:

- *Execution of the IA, wherein the Secretary agrees to changes in the amount and/or location of deliveries of Colorado River water that are necessary to implement the QSA.*
- *Adoption of an Inadvertent Overrun and Payback Policy (IOP), which establishes requirements for payback of inadvertent overuse of Colorado River water by Colorado River water users in the Lower Division States. The IOP is a condition precedent to the execution of the IA and QSA and must be in place by the time these agreements go into effect.*
- *Implementation of biological conservation measures to offset potential impacts from the proposed action that could occur to federally listed fish and wildlife species or their associated critical habitats within the historic floodplain of the Colorado River between Parker Dam and Imperial Dam. These measures were developed and agreed to by the United States Bureau of Reclamation (Reclamation) and the United States Fish and Wildlife Service (FWS) in response to Reclamation's August 2000* Biological Assessment for Proposed Interim Surplus Criteria, Secretarial Implementation Agreements for California Water Plan Components and Conservation Measures on the Lower Colorado River (Lake Mead to the Southerly International Boundary) *(BA) and were incorporated into the January 2001* Biological Opinion for Interim Surplus Criteria, Secretarial

Implementation Agreements, and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary Arizona, California, and Nevada *(BO)*.[1]

Each of these three components of the proposed Federal action is described in detail in Chapter 2. The IA, QSA, IOP, BA/Supplemental BA, and BO are attached to this EIS as appendices. This EIS is being prepared by Reclamation in compliance with the National Environmental Policy Act (NEPA), and Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), which require the evaluation of potential environmental impacts resulting from Federal actions. Reclamation is also involved in the preparation of the IID Water Conservation and Transfer Project Environmental Impact Report (EIR)/EIS, which is described in more detail in section 1.5.1. The Secretary will make a final decision on this Federal action concurrent with a decision on the IID Water Conservation and Transfer Project EIR/EIS.

To better understand the context in which this proposed Federal action is being considered, background regarding the history and current use of Colorado River water in the lower Colorado River Basin is provided below (Figure 1.1-1 shows the Upper and Lower Basins of the Colorado River). This overview provides a brief explanation of the Colorado River System and its operation for flood control and water supply, the Law of the River, and California's historic Colorado River water use.

1.2 COLORADO RIVER WATER SUPPLY MANAGEMENT AND ALLOCATION

In order to understand the impact analysis in this EIS, it is necessary to have a basic understanding of the Colorado River system and how the system is operated. This section provides a general description of the River system and its associated reservoirs and diversion facilities, summarizes the water supply available in the Colorado River Basin from natural runoff, and describes how that water supply is distributed under the Law of the River, including the water order and accounting process.

1.2.1 Colorado River System and Water Supply

The Colorado River system serves as a source of water for irrigation, domestic and other uses in Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming and in the United States of Mexico (Mexico). The Colorado River also serves as a source of water for a variety of recreational activities, hydroelectric power, and environmental benefits.

Most of the total annual flow into the Colorado River Basin (Figure 1.1-1) is a result of natural runoff from mountainous snowmelt. The natural flow of the River is high in the late spring and early summer, diminishing rapidly by mid-summer. "Natural flow" is an estimate of flows that would exist without reservoir regulation, depletion[2], or transbasin diversion by humans. While flows in the late summer through autumn may increase following rain events, natural flow in the late summer through winter is generally low. Major tributaries to the Colorado River include the Green, San Juan, Gunnison, and Gila Rivers.

1. The conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAF.
2. Depletion is defined as consumptive use of Colorado River water (diversions minus return flows), and system losses (including, although not limited to, evaporation, and evapotranspiration).

Figure

1.1-1 Upper and Lower Basins of the Colorado River

(B/W)

The annual flow of the Colorado River varies considerably from year to year. The estimated natural flow at the Lees Ferry gaging station (see Figure 1.1-1), located 17 river miles below Glen Canyon Dam and above Lee Ferry, Arizona,[3] has varied annually from 5 MAF to 24 MAF.

Most of the water in the lower portion of the Colorado River flows into the Lower Basin from the Upper Basin and is accounted for at Lee Ferry, Arizona. In years when the minimum objective release is being made from Glen Canyon Dam, about 92 percent of the annual natural supply is attributed to the releases from the Upper Basin. The minimum objective release is a quantity of 8.23 MAF from Lake Powell for the water year. The remaining eight percent of the water in the lower portion of the River is attributed to sidewash inflows due to rainstorms and tributary rivers in the Lower Basin. In the Lower Basin, the Colorado River mean annual tributary inflow is approximately 1.3 MAF, excluding the intermittent Gila River inflow. Actual Lower Basin tributary inflows are highly variable from year to year.

1.2.2 The Law of the River

The use of Colorado River water is governed by a group of Federal and State laws, interstate compacts, an international treaty, court decisions, Federal contracts, Federal and State regulations, and multi-party agreements. This body of law is commonly referred to as the "Law of the River." Selected documents that comprise the Law of the River are discussed below, and a more comprehensive list is included in Table 1.2-1.

Colorado River Compact of 1922 (Compact) — The 1922 Compact divided the Colorado River into the Upper Basin and the Lower Basin. The drainage basin of the Colorado River, within the United States (U.S.), is shown on Figure 1.1-1. The Upper Basin includes those portions of Arizona, Colorado, New Mexico, Utah, and Wyoming within and from which waters drain naturally into the Colorado River above Lee Ferry, Arizona. The Lower Basin consists of those portions of Arizona, California, Nevada, New Mexico, and Utah within and from which waters drain naturally into the Colorado River system below Lee Ferry. The Compact apportioned to each basin, in perpetuity, the exclusive beneficial consumptive use of 7.5 MAFY. In addition to the 7.5 MAFY apportionment to the Lower Basin, the Lower Basin was given the right to increase its beneficial consumptive use by 1.0 MAFY.

The Compact also divided the seven Colorado River Basin States into the Upper Division and Lower Division States. The Upper Division States are Colorado, New Mexico, Utah, and Wyoming. The Lower Division States are Arizona, California, and Nevada.

Boulder Canyon Project Act of 1928 — In 1928, Congress enacted the Boulder Canyon Project Act of 1928 (BCPA) (45 Stat. 1057), which authorized the Secretary to construct Hoover Dam and the All-American Canal (AAC), and to contract for the delivery and use of water from these facilities for irrigation and domestic uses. Congress conditioned the BCPA upon the ratification of the Compact by at least six of the Colorado River Basin States, including California.

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3. Lee Ferry, Arizona is the division point between the Upper and Lower Basins as established by the Compact (discussed in section 1.2.2) and is located below the Paria River; Lees Ferry is the site of the gaging station located above the Paria River.

Table 1.2-1. Selected Documents Included in the Law of the River

The River and Harbor Act, March 3, 1899.

The Reclamation Act of June 17, 1902.

Reclamation of Indian Lands in Yuma, Colorado River, and Pyramid Lake Indian Reservations Act of April 21, 1904.

Yuma Project authorized by the Secretary of the Interior on May 10, 1904, pursuant to section 4 of the Reclamation Act of June 17, 1902.

Protection of Property Along the Colorado River Act of June 25, 1910.

Warren Act of February 21, 1911.

Patents and Water-Right Certificates Acts of August 9, 1912 and August 26, 1912.

Yuma Auxiliary Project Act of January 25, 1917.

Availability of Money for Yuma Auxiliary Project Act of February 11, 1918.

Sale of Water for Miscellaneous Purposes Act of February 25, 1920.

Federal Power Act of June 10, 1920.

The Colorado River Compact, 1922.

The Colorado River Front Work and Levee System Acts of March 3, 1925, June 21, 1927, June 28, 1946

The Boulder Canyon Project Act of December 21, 1928.

The California Limitation Act of March 4, 1929.

The California Seven Party Agreement of August 18, 1931.

The Rivers and Harbors Act of August 30, 1935.

The Parker and Grand Coulee Dams Authorization Act of August 30, 1935.

The Parker Dam Power Project Appropriation Act of May 2, 1939.

The Reclamation Project Act of August 4, 1939.

The Boulder Canyon Project Adjustment Act of July 19, 1940.

U.S.–Mexico Water Treaty, February 3, 1944.

The Flood Control Act of December 22, 1944.

Gila Project Act of July 30, 1947.

The Upper Colorado River Basin Compact of October 11, 1948.

Consolidated Parker Dam Power Project and Davis Dam Project Act of May 28, 1954.

43 CFR Part 414

43 CFR Part 417

Palo Verde Diversion Dam Act of August 31, 1954.

Change Boundaries, Yuma Auxiliary Project Act of February 15, 1956.

The Colorado River Storage Project Act of April 11, 1956.

Water Supply Act of July 3, 1958.

Boulder City Act of September 2, 1958.

Report of the Special Master, Simon H. Rifkind, *Arizona* v. *California*, et al., December 5, 1960.

United States Supreme Court Decree, *Arizona* v. *California*, March 9, 1964.

International Flood Control Measures, Lower Colorado River Act of August 10, 1964.

Minutes 218, March 22, 1965; 241, July 14, 1972, (replaced 218); and 242, August 30, 1973, (replaced 241) of the International Boundary and Water Commission, pursuant to the U.S.–Mexico Water Treaty.

Southern Nevada (Robert B. Griffith) Water Project Act of October 22, 1965.

The Colorado River Basin Project Act of September 30, 1968.

Criteria for the Coordinated Long Range Operation of Colorado River Reservoirs, June 8, 1970.

Supplemental Irrigation Facilities, Yuma Division Act of September 25, 1970.

The Colorado River Basin Salinity Control Act of June 24, 1974, as amended.

United States Supreme Court Supplemental Decrees, *Arizona* v. *California*, January 9, 1979, and April 16, 1984.

Hoover Powerplant Act of August 17, 1984 (98 Stat. 1333).

The Numerous Colorado River Water Delivery and Project Repayment Contracts with the States of Arizona and Nevada, cities, water districts, and individuals.

Hoover and Parker-Davis Power Marketing Contracts.

The Grand Canyon Protection Act of 1992 (Public Law 102-575, 106 stat. 4669).

The Reclamation States Emergency Drought Relief Act of March 5, 1992, as extended by the Act of January 24, 2000.

The Interim Surplus Guidelines Record of Decision, effective February 25, 2001.

The BCPA authorized the States of Arizona, California, and Nevada to enter into an agreement in which Nevada would be entitled to 0.3 MAFY and Arizona 2.8 MAFY of the 7.5 MAFY apportioned to the Lower Basin for beneficial use by Article III, paragraph A of the Compact, leaving 4.4 MAFY available for California. The authorized agreement would have also provided Arizona with one-half of the excess or surplus waters unapportioned by the Compact. Such an agreement was never executed by Arizona, California, and Nevada. The BCPA's implementation was conditioned upon the State of California irrevocably and unconditionally agreeing to the following if Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming had not ratified the Compact within six months of passage of the BCPA:

- Limiting annual consumptive use (diversions less return flow to the River) in California to no more than 4.4 MAFY of the 7.5 MAFY of the waters apportioned to the Lower Division States by the Compact; plus
- Utilizing not more than one-half of any excess or surplus waters unapportioned by the Compact.

California addressed this requirement by passing the California Limitation Act in 1929.

Section 5 of the BCPA authorizes the Secretary to contract with entities and individuals in the Lower Division States (including the States themselves) for delivery of Colorado River water. These contracts are generally referred to as "Section 5 Contracts," and are for permanent service.

California Seven Party Agreement of 1931 (Seven Party Agreement) — The 1964 Decree of the U.S. Supreme Court established the apportionment of Colorado River water among the Lower Division States. Prior to entering into Section 5 water delivery contracts with California agencies, the Secretary requested that those agencies recommend to the Secretary an apportionment of the California share of Colorado River water among California water users. In response, seven major California entities executed the Seven Party Agreement, in which the California entities agreed to an apportionment of California's share of Colorado River water and agreed to priorities among the seven parties, and recommended the adoption of such by the Secretary. The terms of the Seven Party Agreement were incorporated into the Secretarial regulations dated September 29, 1931 and into the Section 5 water delivery contracts with the Secretary, thereby placing the recommended apportionment into effect. Figure 1.2-1 schematically shows the allocation, by priority, of Colorado River water to entities within California under the Seven Party Agreement. Many of California's major diverters on the Colorado River do not have exact, quantified apportionments, although their entitlements are capped at an overall maximum by priority. The amount of Colorado River water apportioned under the Seven Party Agreement total 5.362 MAFY, or 0.962 MAFY more than California's 4.4 MAF apportionment in a normal year. Therefore, diversions of more than 4.4 MAF under Priorities 5a, 5b, and 6 in any given year are dependent upon the following conditions: surplus water is available; Arizona and/or Nevada do not divert their full apportionments; less than 4.4 MAFY is used within California by entities with higher priorities; or entities with Priorities 1 through 3 and Present Perfected Rights (PPRs) take less than 3.85 MAFY. (PPRs are defined under the discussion of *Arizona v. California*, immediately below.)

United States-Mexico Water Treaty of 1944) — Under Article 10(a) of the *Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande — Treaty between the United States of America and Mexico* dated February 3, 1944, Mexico is entitled to an annual amount of 1.5 MAF of Colorado River water. Under Article 10(b) of the United States-Mexico Water Treaty of 1944, Mexico may

Figure
1.2-1 Colorado River Water Allocation under the Seven Party Agreement

schedule up to an additional 0.2 MAF when "there exists a surplus of waters of the Colorado River in excess of the amount necessary to satisfy uses in the United States."

Arizona v. California 1964 Supreme Court Decree (Decree) — In 1964, the Supreme Court of the U.S. entered its Decree in *Arizona v. California* (376 U.S. 340), and supplemental Decrees were entered in 1979 (439 U.S. 419), 1983 (460 U.S. 605), and 2000 (531 U.S. 1). In accordance with the BCPA, and after providing that water may be released to satisfy the United States-Mexico Water Treaty of 1944, the Decree apportioned water available for release from Colorado River water controlled by the U.S. for use in the States of Arizona, California, and Nevada. The Decree also recognized certain Federal reserved rights and provided a process for the quantification of all claimed PPRs, all to be supplied from the existing apportionments of the respective States. In the context of Colorado River water, as set forth in the Decree, the term "PPRs" refers to water rights based upon diversion and beneficial use prior to the effective date of the BCPA (June 25, 1929).[4] A Federal reserved right PPR for an Indian reservation does not need to be diverted or put to beneficial use to be established or preserved but remains reserved for that reservation as of the date of creation of the reservation. All PPRs are numbered, and their relative priorities are set forth within the supplemental Decree entered January 9, 1979, although some of the Federal reserved right PPRs have been further modified by the supplemental Decrees entered in 1979, 1984, and 2000. The Federal reserved right PPRs identified in Article II(D)(1)-(5) of the Decree have the highest priority and are identified in the 1979 supplemental Decree as numbers 1-3, 22-25, and 81. The miscellaneous PPRs identified in the 1979 supplemental decree as numbers 7-21 and 29-80 have the next highest priority. After Federal and Miscellaneous PPRs are satisfied, the next category of water rights to be satisfied are the PPRs for water projects and water districts, which are identified in the 1979 supplemental decree as numbers 4-6, 26-28, and 82.

The Decree enjoins the Secretary from releasing or delivering water other than to water users in the U.S. with valid contracts made pursuant to Section 5 of the BCPA or to specified Federal reservations. The Decree provides the parameters for delivering water in "normal," "surplus," and "shortage" years. The Decree directs the Secretary to release 4.4 MAF of mainstream water controlled by the U.S. to California in a normal year. In addition to the normal year allocation, in a surplus year as determined by the Secretary, the Secretary shall apportion 50 percent of the water in excess of 7.5 MAF for use in California. In a shortage year, the Secretary must first satisfy all of the PPRs pursuant to the 1964 Decree and subsequent Decrees. The Secretary must then apportion the remaining water consistent with the BCPA and the Decree, but in no event shall more than 4.4 MAF be apportioned for use in California, including use by all PPRs. The Decree also provides that Colorado River water apportioned to a Lower Division State, but not used by that State, may be made available to another Lower Division State (unused apportionment). California, therefore, has historically been allowed to divert water that was apportioned to, but not used by, Arizona and Nevada.

Colorado River Basin Project Act of 1968. The purpose of the Colorado River Basin Project Act of 1968 (CRBPA) was to regulate the flow of the Colorado River; control floods; improve navigation; provide for the storage and delivery of Colorado River water for reclamation of lands, including supplemental water supplies, and for municipal, industrial and other beneficial uses; improve

4. Federal Reserved Rights do not require diversion and use to be considered valid water rights under the concepts embodied in the Federal Reserved Rights Doctrine.

water quality; provide for basic public outdoor recreation facilities; improve conditions for fish and wildlife and the generation and sale of electrical power as an incident of the foregoing purposes. This Act authorized construction of a number of water development projects, including the Central Arizona Project (CAP) and required the Secretary to develop the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (LROC).

1.2.3 Operation of the Colorado River

Long-Range Operating Criteria

The CRBPA required the Secretary to adopt operating criteria for the Colorado River by January 1, 1970. The LROC, adopted in 1970, controls the operation of the Colorado River reservoirs in compliance with requirements set forth in the Compact, the Colorado River Storage Project Act of 1956, the BCPA, the CRBPA, the United States-Mexico Water Treaty of 1944, and other applicable Federal laws. Under the LROC, the Secretary makes annual determinations published in the Annual Operating Plan (AOP) (discussed in the following section) regarding the availability of Colorado River water for deliveries to the Lower Division States. A requirement to equalize the active storage between Lake Powell and Lake Mead when there is sufficient storage in the Upper Basin is also included in the LROC.

Section 602 of the CRBPA, as amended, provides that the LROC can only be modified after correspondence with the governors of the seven Basin States and appropriate consultation with such State representatives as each governor may designate. The LROC call for formal reviews at least every 5 years. The reviews are conducted as a public involvement process and are attended by representatives of Federal agencies, the seven Basin States, Indian Tribes, the general public including representatives of the academic and scientific communities, environmental organizations, the recreation industry, water contractors, and contractors for the purchase of Federal power produced at Glen Canyon Dam. Past reviews have not resulted in any changes to the LROC.

Annual Operating Plan

The CRBPA also requires the preparation of an AOP for the Colorado River reservoirs that guides the operation of the system for the following year. The AOP describes how Reclamation will manage River resources over the 12-month period, consistent with the LROC and the Decree. The AOP is prepared annually by Reclamation in cooperation with the Basin States, other Federal agencies, Indian tribes, State and local agencies and the general public, including governmental interests as required by Federal law. As part of the AOP process, the Secretary makes annual determinations regarding the availability of Colorado River water for deliveries to the Lower Division States as described below.

Normal, Surplus, and Shortage Determinations

The Secretary is required to determine when "normal," "surplus," and "shortage" conditions occur on the lower portion of the Colorado River.[5] These conditions are determined in the AOP and are referred to as "normal," "surplus," and "shortage" years. As generally set forth in the Decree, a

5. For the purposes of this EIS, the "lower portion of the Colorado River" is defined as the historic floodplain between Lake Mead and SIB, including reservoirs to full-pool elevations.

"normal year" occurs if sufficient mainstream Colorado River water is available to satisfy 7.5 MAF of annual consumptive use in the three Lower Division States (Arizona, California, and Nevada); a "surplus year" occurs if sufficient mainstream water is available for release to satisfy in excess of 7.5 MAF of annual consumptive use in the three Lower Division States; a "shortage year" occurs if insufficient mainstream water is available for release to satisfy 7.5 MAF of annual consumptive use in the Lower Division States. The Secretary makes an annual determination of the water supply conditions, in consultation with the Basin States, Indian Tribes, and other parties, as described in more detail below.

Interim Surplus Guidelines

As discussed above, California has been legally diverting more than its normal 4.4 MAFY apportionment of Colorado River water for many years and has developed the California Plan to assist the State to reduce its use of Colorado River water to its apportionment of 4.4 MAF in a normal year. The Secretary has developed specific Interim Surplus Guidelines (ISG) that will provide mainstream users of Colorado River water, particularly those in California that currently utilize surplus water, a greater degree of predictability with respect to the likely existence, or lack thereof, of a surplus determination in a given year for the interim period (from 2002 to 2016). The guidelines facilitate California's transition to use of a reduced supply of Colorado River water. A Final EIS was released that assesses the impacts of these guidelines (U.S. Bureau of Reclamation [USBR] 2000b) and a Record of Decision (ROD) has been adopted (*Federal Register*, Vol. 66, No. 17, January 25, 2001, Notices).

The action addressed in that Final EIS was the adoption of specific ISG pursuant to Article III (3)(b) of the LROC. The ISG will be used annually during the interim period to determine the conditions under which the Secretary may declare the availability and volume of surplus water for use within the States of Arizona, California, and Nevada. The ISG are consistent with both the Decree and the LROC. The ISG will remain in effect for determinations made through calendar year (CY) 2015 regarding the availability and volume of surplus water through CY 2016. The ISG may be subject to 5-year reviews conducted concurrently with LROC reviews. The ISG would be applied each year as part of the AOP for Colorado River Reservoirs. The ISG, as adopted in the ROD, provide for certain benchmarks for reduction of California's Colorado River water use and other actions. In the event that California contractors have not executed the QSA by December 31, 2002, the Interim Surplus determinations identified in the ISG ROD will be suspended and surplus determinations will be based upon the 70R Strategy[6], until such time California completes all actions and complies with reductions in water use identified in Section 5(c) of the ISG ROD. Section 5(c) establishes benchmark quantities and dates for reductions in California agricultural usage, and states that in the event California has not reduced its use to meet the benchmark quantities, the Interim Surplus determinations identified in the ISG ROD will be suspended and determinations will be based on the 70R strategy. Section 5(c) also provides conditions regarding reinstatement of ISG surplus determinations if missed benchmarks are later met. The ISG ROD states, "At the conclusion of the effective period of these Guidelines [Calendar year 2016], California shall have implemented

6. The 70R Strategy defined one of the factors considered by Reclamation prior to adoption of the ISG. The 70R Strategy process assumed a 70-percentile inflow into Lake Powell and after deducting consumptive uses and system losses and checks the results to see if all of the water could be stored or if flood control releases from Lake Mead would be required. If flood control releases from Lake Mead would be required, surplus water would be made available to Arizona, California, and Nevada beyond its normal year apportionment of 7.5 MAF.

sufficient measures to be able to limit total uses of Colorado River water within California to 4.4 MAF, unless a surplus is determined….". The water conservation and transfer projects described in the QSA, which would be implemented by the IA, will facilitate compliance with the benchmarks and normal year apportionment.

Water Orders and Decree Accounting

Water Orders

Each September, Reclamation requires water users to submit diversion schedules, or estimates of the amount of water they would need to divert from the Colorado River during the following calendar year. These schedules, commonly referred to as annual water orders, are estimates of monthly diversions required by the water user for the following calendar year. Reclamation uses these annual water orders to determine a tentative schedule of monthly releases for Hoover Dam, Davis Dam, and Parker Dam.

In addition to the annual water order, weekly water orders are also submitted to Reclamation. Each Wednesday, a water user submits a weekly water order to Reclamation for the following week's (Monday through Sunday) water requirement. After Reclamation has accumulated all the weekly water orders from all water users in the Lower Division, Reclamation then prepares a master schedule of flows. Daily changes in water orders are made to accommodate emergencies, changes in weather and daily water schedules, holidays, dam maintenance and construction activities, and various other parameters. In December of each year, Mexico provides the U.S. with a monthly water order for the upcoming year.

Decree Accounting

In accordance with Article V of the Decree (376 U.S. 340), the Secretary compiles and maintains records for the following: diversions of water from the mainstream of the Colorado River; return flow of such water to the mainstream of the Colorado River as is available for consumptive use in the U.S. or in satisfaction of the United States-Mexico Water Treaty of 1944 obligation; and consumptive use of such water, for each State and diverter. Reclamation reports these data for each calendar year in the Decree Accounting Report. The Decree Accounting Report is released within the calendar year following the calendar year of water use (for example, the Decree Accounting Report for CY 1999 was released in July of 2000).

Records of diversions and measured return flows are furnished by a variety of sources including, the United States Geological Survey (USGS), International Boundary and Water Commission, U.S. Bureau of Indian Affairs (BIA), Reclamation, National Park Service, FWS, and Colorado River water users. For most Colorado River water users, diversion and measured return flow records are reported to Reclamation on a monthly basis, with records for any given month due on the 15th of the following month. Reclamation tabulates these reported diversions and measured return flows and issues a monthly report, similar in format to the Decree Accounting Report. These monthly reports contain the cumulative years' provisional diversions, measured return flows and consumptive use for most Colorado River water users (some of the smaller Colorado River water users report diversions on an annual basis only).

Colorado River water may also be diverted through wells or pumped directly from the river. The amount of Colorado River water pumped from wells or the river is reported by the USGS and is generally determined from records of power use. For most electric pumps, diversions are computed on a monthly basis from power records and a "kilowatt hour per acre-foot factor" determined by discharge measurement. For pumps where no power record is available, a consumptive use factor of 6 acre-feet (AF) per irrigated acre of land per year is used to estimate annual consumptive use.

1.2.4 System Reservoirs and Diversion Facilities

The Colorado River system contains numerous reservoirs and facilities constructed by Reclamation that combined, provide approximately 60 MAF of active storage. The Lower Basin dams and reservoirs include Hoover, Davis, Parker, Headgate Rock, Palo Verde Diversion, Imperial, Laguna and Morelos Dams. Hoover Dam created Lake Mead, which can store up to 27.4 MAF of live storage. Davis Dam was constructed to re-regulate Hoover Dam's releases to aid in the annual United States-Mexico Water Treaty of 1944 deliveries to Mexico. Davis Dam creates Lake Mohave and provides 1.8 MAF of storage. Parker Dam forms Lake Havasu, which provides up to 0.648 MAF of storage. Headgate Rock Dam forms Lake Moovalya and is a run-of-the-river structure (i.e. creates a small impoundment, but has no substantial storage capacity). Palo Verde Diversion Dam forms an unnamed impoundment and is a run-of-the-river structure. Imperial Dam approximately 28 miles northeast of Yuma, Arizona, is a diversion and desilting facility for the AAC and the Gila Main Gravity Canal. Laguna Dam forms an unnamed impoundment and can store up to 700 AF. Morelos Dam, near the Northerly International Boundary (NIB), is the primary delivery point for Colorado River water under the United States-Mexico Water Treaty of 1944. Table 1.2-2 summarizes the storage facilities and major diversion dams from Glen Canyon Dam to Morelos Dam (refer to Figure 1.1-1 for general location).

Table 1.2-2. Colorado River Storage Facilities and Major Diversion Dams from Glen Canyon to Morelos Dam

Facility	*Reservoir*	*Location*	*Storage Capacity (AF)*
Glen Canyon Dam	Lake Powell	Upstream of Lee Ferry, Arizona	24,322,000 Live
Hoover Dam	Lake Mead	Nevada and Arizona near Las Vegas, 270 miles downstream of Glen Canyon Dam	27,400,000 Live
Davis Dam	Lake Mohave	70 miles downstream of Hoover Dam	1,818,000
Parker Dam	Lake Havasu[1]	150 miles downstream of Hoover Dam	648,000
Headgate Rock Dam	Lake Moovalya	164 miles downstream of Hoover Dam	N.A.[3]
Palo Verde Diversion Dam	Unnamed impoundment	209 miles downstream of Hoover Dam	N.A.[3]
Senator Wash regulating facility[5]	Senator Wash Reservoir[2]	290 miles downstream of Hoover Dam near Imperial Dam	13,800[4]
Imperial Dam	Unnamed impoundment	290 miles downstream of Hoover Dam	1000
Laguna Dam	Unnamed impoundment	300 miles downstream of Hoover Dam	700
Morelos Dam	Unnamed diversion structure	320 miles downstream of Hoover Dam	NA[3]

1. Lake Havasu provides a relatively constant water level for water diversions.
2. Senator Wash Reservoir is an offstream reservoir with a pumping/generating plant.
3. Run-of-river diversion structure.
4. Current operating restrictions limit storage of water.
5. Elevation restrictions are in place, due to potential piping at West Squaw Lake Dike and Senator Wash Dam. Current elevation restrictions have decreased the storage elevation to 235 feet (from 240 feet), with normal operations ranging from 218 to 233 feet.

Major Diversions for the State of Arizona — There are several points of diversion of Colorado River water in Arizona, including, but not limited to, the following:

- the CAP facilities in Lake Havasu, for the Central Arizona Water Conservation District (CAWCD) and Indian contractors;
- water pumped from wells for the Fort Mojave Indian Reservation, near Needles, California;
- diversions at Headgate Rock Dam for the Colorado River Indian Reservation near Parker, Arizona;
- diversions in the Cibola area to irrigate lands adjacent to the River; and
- diversions at Imperial Dam into the Gila Gravity Main Canal, and into the AAC for subsequent release into the Yuma Main Canal.

Arizona is also apportioned the consumptive use of 50 thousand acre-feet per year (KAFY) of water from the Upper Basin. This water is diverted above Lee Ferry.

Major Diversions for the State of California **—** California receives most of its Colorado River water at three diversion points:

- the Whitsett Pumping Plant, owned and operated by MWD in Lake Havasu;
- the Palo Verde Diversion Dam, which diverts water for the Palo Verde Irrigation District (PVID); and
- the AAC diversion at Imperial Dam, which diverts water for the Yuma Project Reservation Division (YPRD), IID, and the CVWD.

Major Diversions for the State of Nevada

- Approximately 90 percent of Nevada's apportionment is diverted at Saddle Island in Lake Mead by the Southern Nevada Water Authority (SNWA); and
- the remainder of the State's apportionment is diverted below Davis Dam in the Laughlin area.

1.3 BACKGROUND RELEVANT TO THE PROPOSED ACTION

1.3.1 Background Relevant to the Implementation Agreement

Key Concepts

The concepts of “apportionment,” “entitlement,” “beneficial use as reasonably required,” and “priority” are key to understanding the Law of the River. “Apportionment” refers to the distribution of Colorado River water between the Upper and Lower Basin States as identified in the Compact, within the Lower Division States as identified in the BCPA and the Decree, and within the State of California as identified in the Seven Party Agreement. “Entitlements” are legal authorization to beneficially consume Colorado River water and are obtained through historical diversion rights under State law and a right recognized under the Decree, a contract with the U.S. through the Secretary or a Secretarial reservation of water. It is the entitlement, not the apportionment, which established a right to consumptively use Colorado River water. “Beneficial use as reasonably required” refers to the appropriate consumptive use of water by an entitlement holder based on such factors as location of use, purpose of use, types of crops, condition of delivery facilities and past record of water orders (see 43 CFR Part 417). As stated in the Seven Party Agreement and the 1931 Secretarial regulations, “Priority” refers to an entity’s ability to use its Colorado River water relative to all other entities.

The flow in the Colorado River is variable, and it may not always be possible to meet all water demands. When water demands cannot be met in the aggregate, the entity with the highest priority water rights is entitled to have its request for beneficial use as reasonably required met first. The entity with the next highest priority is entitled to have its request met second, and so on through all subordinate users, as long as supplies are available. In the Seven Party Agreement (described above), priority is ranked numerically, with Priority 1 being the highest. When insufficient water supplies are available to meet all of California’s beneficial uses, a reduction in the amount of water available to California for beneficial use as reasonably required would impact those entities with the lower water priority. Under such circumstances, entities with lower priorities may have only some or none of their request met.

Historic Water Diversions by California — The Decree accounting process established after the Decree forms the basis for comparing years of California use of Colorado River water. California’s use of Colorado River water from 1964 to 1999 varied from 4.2 to 5.4 MAFY, with an average of 4.9 MAFY. The 1990 to 1999 period includes ranges of 4.5 to 5.2 MAFY, with an average of 5.0 MAFY. To date, California’s demands in excess of 4.4 MAFY have been met in part by Colorado River water apportioned to Arizona and Nevada but not used by those States (unused apportionment), and by water designated as surplus by the Secretary. The amount of unused apportionment that previously was available to California is diminishing, and unused apportionment is not likely to be available in future years. This is due to the commencement of operation of the CAP in 1985 (a project that delivers Colorado River water to central Arizona irrigation districts, cities, and Indian Tribes), its substantial completion in 1993, and growing demand for water in Nevada.

Recently, California water agencies completed a major step toward reducing California’s reliance on Colorado River water in excess of its apportionment of 4.4 MAFY in a normal year when they negotiated the Key Terms and developed an overall California Plan. The California Plan describes an overall program that would assist California in limiting the State’s use of Colorado River water to its 4.4 MAFY apportionment in a normal year. The QSA provides for implementation of major components of the California Plan and incorporates the contractual agreements necessary for California to reduce its use of Colorado River water. The QSA is a proposed agreement among CVWD, IID, and MWD to budget their portion of California's apportionment of Colorado River water among themselves and to make water conserved in the IID service area available to CVWD, MWD, and SDCWA. The QSA is composed of related agreements, activities and projects, which, when taken together, support the consensual agreement among the four agencies regarding the use of Colorado River water. The QSA Program Environmental Impact Report (PEIR) (CVWD et al. 2002) provides program-level California Environmental Quality Act (CEQA) analysis for the implementation of the QSA.

One of the agreements under the QSA is the IID/SDCWA Water Conservation and Transfer Agreement (as amended under the QSA). Project-level CEQA and NEPA analysis for the IID/SDCWA Water Conservation and Transfer Agreement, including the change in point of diversion of up to 300 KAFY from Imperial Dam to Lake Havasu, SDCWA use of conserved water, water conservation by IID, and the related Habitat Conservation Plan (HCP) is provided in the IID Water Conservation and Transfer Project EIR/EIS (IID and USBR 2002).

The IA, an agreement between CVWD, IID, MWD, SDCWA, and the Secretary, specifies the federal actions that are necessary to implement the QSA. Execution of the IA would commit the Secretary to making Colorado River water deliveries in accordance with the terms and conditions of the IA to enable the implementation of the QSA. The execution of the IA would authorize changes in the amount and/or location of deliveries of up to 388 KAFY of Colorado River water. Execution of the IA is a condition precedent to the QSA. This EIS evaluates the environmental impacts of the execution of the IA and related accounting and environmental actions as required under NEPA.

1.3.2 Background Relevant to the Inadvertent Overrun and Payback Policy

In accordance with Article V of the Decree, the Secretary compiles and maintains records for the following: diversions of water from the mainstream of the Colorado River; return flow of such water to the mainstream of the Colorado River as is available for consumptive use in the U.S. or in satisfaction of the United States-Mexico Water Treaty of 1944 obligation; and consumptive use of such water. Reclamation reports these data each year in the Decree Accounting Report, as described in section 1.2.3 above.

The Secretary annually consults with representatives of the governors of the Colorado River Basin States, general public and others, and then issues an AOP (described in section 1.2.3) for the coordinated operation of the Colorado River reservoirs. This is done pursuant to the LROC (described in section 1.2.3). Reclamation also requires each Colorado River water user in the Lower Division to submit diversion schedules or estimates of the amount of water the users would need to divert, in advance, for the following calendar year (the calendar year is the annual basis for Decree accounting of consumptive use in the Lower Division). Each user must also report actual water diversions and returns to the mainstream.

Pursuant to 43 CFR part 417, prior to the beginning of each calendar year, Reclamation consults, as appropriate, with holders of BCPA Section 5 contracts (Contractors) for the delivery of water. Under these consultations, Reclamation makes recommendations related to water conservation measures and operating practices in the diversion, delivery, distribution, and use of Lower Division water. Reclamation also reviews the Contractor's estimated water requirements for the ensuing calendar year to determine whether or not deliveries of Colorado River water to each Contractor will exceed those reasonably required for beneficial use under the respective BCPA contract or other authorization for use of Colorado River water. Reclamation then monitors the actual water orders, receives reports of measured diversions and return flows from major Contractors and Federal establishments, estimates unmeasured diversions and return flows, calculates consumptive use from preliminary diversions and measured and unmeasured return flows, and reports these records on an individual and aggregate monthly basis. After the end of the reporting year, when final records are available, Reclamation prepares and publishes the final Decree Accounting Report.

For various reasons, a user may inadvertently consumptively use Colorado River water in an amount that exceeds the amount available under its entitlement (inadvertent overrun). Further, the final Decree Accounting Report may show that an entitlement holder inadvertently diverted water in excess of the quantity of the entitlement that may not have been evident from the preliminary records. As noted in the QSA, IID, MWD, and CVWD have indicated that implementation of the water conservation and transfer projects as described in the QSA cannot be undertaken without the flexibility to payback inadvertent overruns over time. Reclamation is therefore proposing an administrative policy that defines inadvertent overruns, establishes procedures that account for the inadvertent overruns, and defines the subsequent requirements for payback to the Colorado River mainstream (see Appendix I for the complete text of the proposed IOP policy). The application of the IOP has been determined by IID, CVWD, and MWD to be essential to their willingness to enter into the QSA and related agreements.

1.3.3 Background Relevant to the Biological Conservation Measures

In August 2000, Reclamation submitted a BA to the FWS. This assessment covered potential effects to endangered species in the Lower Basin from the proposed ISG (formerly referred to as "Interim Surplus Criteria" and described above in section 1.2.3) and changes in points of delivery and diversion, or water transfers, pursuant to the IA[7]. As part of the BA, and to reduce impacts to endangered species, Reclamation included as part of the project a number of biological conservation measures, such as creation of additional backwaters, and other specific measures. The FWS issued its BO on January 12, 2001. The FWS concluded the proposed Federal actions, with implementation of the proposed conservation measures, would not jeopardize the continued existence of any threatened or endangered species. This EIS provides the analysis of impacts for the biological conservation measures at a programmatic level, based on available information. Although additional environmental assessment may be required to be undertaken by Reclamation prior to implementation of certain biological conservation measures, no additional assessment is required in order to implement the change in the point of delivery pursuant to the IA and QSA.

1.4 PURPOSE AND NEED

The Secretary, pursuant to the BCPA and Decree, proposes to take Federal actions necessary to support the implementation of the QSA. The purpose of the Federal action is to facilitate implementation of the QSA, which incorporates contractual agreements necessary for California to reduce its use of Colorado River water. The need for the Federal action is to assist California's

7. The conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAFY while IA related changes in points of delivery may range up to 388 KAFY.

efforts to reduce its use of Colorado River water to its 4.4 MAF apportionment in a normal year. This reduction in California's use of Colorado River water would benefit the entire Colorado River Basin.

The major components of the proposed action include execution of the IA, adoption of an IOP, and implementation of biological conservation measures associated with the water transfers included in the IA. The proposed IA identifies specific deliveries of Colorado River water that are to be made consistent with the components of the QSA (see Table 2.2-1). These deliveries are needed to implement actions being taken to conserve and transfer Colorado River water among the participating California water agencies, the ultimate goal being to reduce California's use of Colorado River water to its 4.4 MAF apportionment during a normal year.

The IOP establishes Decree accounting practices that account for overruns and provides a mechanism for payment of inadvertent overuse back to the River system. Decree accounting is the responsibility of the Secretary. Adoption of an IOP is a condition precedent to execution of the QSA. The underlying need for the IOP is to ensure that Colorado River water users do not exceed their entitlements, by providing a mechanism to "pay back" the River system for inadvertent overuse. The QSA cannot be fully implemented without the approval of the Secretary, since it involves transfers of Colorado River water among the three parties, and requires changes in points of delivery and diversion from the River, which must be approved by the Secretary. As indicated in the IA, the Secretary acknowledges the ongoing importance of the IOP to the QSA.

The biological conservation measures proposed to be implemented were identified in the BA as part of the QSA-related water transfers. These conservation measures are needed to mitigate impacts and avoid adverse modification of critical habitat anticipated to result from the reduction in downstream flow due to the proposed change to an upstream point of diversion of Colorado River water that is associated with the IA and QSA[8].

The components of the proposed action and their relationship to one another are explained in more detail in Chapter 2. This EIS, when finalized, will provide the analyses in compliance with NEPA to allow the Secretary to make a determination of whether or not to approve these actions that would support the implementation of the QSA and, in the broader perspective, assist and support California's efforts to manage its water use and stay within its 4.4 MAF Colorado River water apportionment during normal years.

1.5 RELATIONSHIP TO OTHER PLANNED PROJECTS, PROGRAMS, AND ACTIONS

There are several water resources management plans, programs, and actions that affect the allocation and distribution of Colorado River water in California and adjacent States. A description of these plans, programs, and actions is provided below. The intent is to provide the reader a "road map" to the Colorado River water-related activities in California, and whether and how they relate to the IA. As appropriate, these same projects are included in the Chapter 4 analysis of cumulative impacts, where, in conjunction with the proposed action, they have the potential to contribute to a

8. The conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAFY while IA related changes in points of delivery may range up to 388 KAFY.

cumulative impact. This EIS tiers to and incorporates by reference the information contained in the documents listed below.

1.5.1 Related Projects to and Components of the IA

California's Colorado River Water Use Plan

The California Plan has been developed by the CRB to prepare for likely reductions of Colorado River water available to California. The California Plan, which was released in draft form in May 2000, is available for public review at http://ceres.ca.gov/crb/reports.htm. California's use of Colorado River water varied from 4.2 to 5.4 MAFY from 1964 to 1999, with an average of 4.9 MAFY. The goal of the California Plan is to put in place a realistic strategy to assure that California will be able to reduce its use of Colorado River water to its 4.4 MAFY apportionment in normal years, and to meet its needs from sources that do not jeopardize the apportionments of other States.

The California Plan provides a policy framework by which programs, projects, and other activities would be coordinated and cooperatively implemented, allowing California to most effectively satisfy its annual water supply needs within its annual apportionment of Colorado River water. It includes the conservation of water within Southern California and the transfer of conserved water from agricultural to predominantly urban uses. It also identifies future groundwater conjunctive use projects that could be used to store Colorado River water when available. The California Plan also outlines how California could continue to use surplus Colorado River water during the ISG period (2002 to 2016).

Quantification Settlement Agreement

The QSA provides for implementation of major components of the California Plan and incorporates the contractual agreements necessary for California to reduce its use of Colorado River water. The IA directly relates to the QSA in that the IA reflects the Secretary's agreement to make Colorado River water deliveries, which will enable implementation of the agreements specified in the QSA. However, the Secretary is not a signatory to the QSA, which is an agreement among IID, CVWD and MWD. SDCWA, although not a signatory to the QSA, is a recipient of water pursuant to the QSA, since the QSA would implement a 1998 agreement between IID and SDCWA for transfer of conserved water. The QSA would be in effect for up to 75 years. The QSA is the subject of a PEIR in compliance with CEQA, which was prepared in parallel with this EIS. The components of the IA and QSA are described in detail in Chapter 2 of this EIS. The Draft PEIR (CVWD et al. 2002) was made available at CVWD, Highway 111 at Avenue 52, Coachella, CA 92236; IID Headquarters, 333 East Barioni Blvd., Imperial, CA 92251; MWD Headquarters, 700 N. Alameda St., Los Angeles, CA 90012; and SDCWA, 4677 Overland Avenue, San Diego, CA 92123. The Final EIS/EIR was filed with the U.S. Environmental Protection Agency (EPA) on “ “ 2002 and noticed in the *Federal Register* on “ “ 2002.

Interim Surplus Guidelines

These guidelines are discussed in section 1.2.3 above.

Coachella Valley Water Management Plan

CVWD prepared the Coachella Valley Water Management Plan (CVWMP) (CVWD 2000a) to establish an overall program for managing its surface and groundwater resources in the future. The CVWMP involves a number of actions to reduce the current overdraft of the groundwater basin in the Coachella Valley. These actions include increased use of Colorado River water to reduce groundwater pumping, water recycling, and conservation measures to decrease the overall consumption of water. The CVWMP (CVWD 2000a) is available from CVWD, Highway 111 at Avenue 52, Coachella, CA 92236, and is published on the Internet at http://www.cvwd.org/Public_Docs.htm. The potential environmental impacts of the overall CVWMP will be addressed in a PEIR by CVWD.

Water that becomes available through implementation of the IA and QSA will be used to reduce groundwater overdraft in the Coachella Valley. The IA/QSA related elements of the CVWMP are described in detail in Chapter 2 of this EIS. Under the IA and QSA, from 55 to 155 KAFY of Colorado River and an exchange of State Water Project (SWP) water would be used to replace an equivalent portion of the groundwater now used, or would be used for direct groundwater recharge. Reducing the amount of groundwater pumpage and increasing the use of imported water would allow the overdrafted aquifer to recover.

San Luis Rey Indian Water Rights Settlement

On November 17, 1988, the President approved the San Luis Rey Indian Water Rights Settlement Act (Title I of Public Law 100-675) as amended by the Act of October 27, 2000, and Public Law 106-377. The San Luis Rey Indian Water Rights Settlement Act authorizes a source of water to settle the reserved water rights claims of the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, the City of Escondido, the Escondido Mutual Water Company (which is no longer in existence), and Vista Irrigation District[9]. The Act authorizes the Secretary to arrange for development of a water supply for the benefit of the bands of not more than 16 KAFY and authorized the Secretary to use water conserved from the works authorized by Title II of the same Act for this purpose. The IA provides that the Secretary deliver Priority 3a water conserved from the AAC and Coachella Canal lining projects (described below) to MWD and/or IID and make water available for the benefit of the San Luis Rey Indian Water Rights Settlement Parties. The October 27, 2000 Amendment states the Secretary shall permanently furnish annually 16 KAF of the water conserved by the works authorized by Title II for the benefit of the San Luis Rey Indian Water Rights Settlement Parties in accordance with the settlement agreement. The implementation agreement for the San Luis Rey Indian Water Rights Settlement Act was signed January 18, 2001, and a copy of this implementation agreement is provided in Appendix H of this EIS. The settlement agreement is under negotiation.

All-American Canal Lining Project

The lining of the AAC was authorized by Title II of Public Law 100-675, dated November 17, 1988 and in accordance with the terms of the Allocation Agreement. This Act authorizes the Secretary to

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9. La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, the City of Escondido, the Escondido Mutual Water Company, and Vista Irrigation District are collectively termed the San Luis Rey Indian Water Rights Settlement Parties within this EIS.

construct a new lined canal or to line the previously unlined portions of the AAC to reduce seepage of water. Title II authorizes the Secretary to determine the amount of water conserved by this canal lining. The Act further directs that the water so conserved be made available for consumptive use by California contractors within their service areas according to their priority under the Seven Party Agreement. Reclamation prepared a Final EIS/EIR for the AAC Lining Project in March 1994 (USBR and IID 1994). This EIS/EIR states that the preferred alternative for reducing seepage from the AAC would conserve approximately 67.7 KAFY. The Final EIS/EIR was filed with the EPA on April 14, 1994 and noticed in the *Federal Register* on April 19, 1994. A ROD was prepared and signed by the Lower Colorado Region's Regional Director on July 29, 1994. The canal-lining project has been approved but not yet constructed.

The QSA divides the 67.7 KAF of annually conserved water as follows: 56.2 KAFY to MWD and/or IID under certain circumstances and 11.5 KAFY for San Luis Rey Indian Water Rights Settlement Act purposes. The State of California enacted legislation to assist in funding the lining of the AAC to help facilitate implementation of the California Plan. The change in point of delivery and the use of conserved water from this project is considered in this EIS.

Coachella Canal Lining Project

The lining of the previously unlined portions of the Coachella Branch of the AAC (Coachella Canal) was also authorized by Title II of Public Law 100-675. This Act authorizes the Secretary to construct a new lined canal or to line the previously unlined portions of the Coachella Canal to reduce seepage of water. As with the AAC, Title II authorizes the Secretary to determine the amount of conserved water and directs that the water so conserved be made available for consumptive use by California contractors within their service areas according to their priority under the Seven Party Agreement. Reclamation prepared a Draft EIS/EIR for the Coachella Canal Lining Project in December 1993. This draft was updated and recirculated for public review in September 2000. The Final EIS/EIR was filed with the EPA in April 2001. A ROD was prepared and signed by the Lower Colorado Region's Regional Director on March 27, 2002. The preferred alternative for reducing seepage from the Coachella Canal would result in projected water savings for purposes of the QSA of approximately 26 KAFY.

The QSA divides the 26 KAFY of conserved water as follows: 21.5 KAFY to MWD and/or IID under certain circumstances and 4.5 KAFY for San Luis Rey Indian Water Rights Settlement Act purposes. Title I of Public Law 100-675 authorizes use of some of the conserved water to settle the reserved water rights claims of the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians in San Diego County, California. The legislation enacted by the State of California to fund the lining of the AAC includes funding to line the Coachella Canal. The change in point of delivery and the use of conserved water from this project is considered in this EIS.

IID/SDCWA Water Conservation and Transfer Agreement

IID, as the lead agency under CEQA, and Reclamation, as the lead agency under NEPA, are preparing the IID Water Conservation and Transfer Project EIR/EIS to assess the transfer of up to 300 KAFY of water conserved by IID to SDCWA, pursuant to the 1998 IID/SDCWA Water Conservation and Transfer Agreement. Also, this EIR/EIS assesses the water transfers by IID that would apply if the QSA is approved and implemented. The QSA limits SDCWA to 200 KAFY of water conserved by IID; provides an option to CVWD to acquire up to 100 KAFY of conserved water transferred by IID, in two 50 KAFY increments; and provides an option to MWD to acquire any portion of this 100 KAFY that CVWD elects not to acquire. The IID Water Conservation and Transfer Project EIR/EIS (IID and USBR 2002) assesses the IID conservation program and the transfer and use of conserved water by SDCWA at a project level. The impacts of the receipt and use of conserved water by MWD pursuant to the QSA are addressed in the QSA PEIR. The effects of receipt and use of conserved water by CVWD pursuant to the QSA are addressed programmatically in the EIR/EIS and at a project level in the QSA PEIR and the PEIR being prepared for the CVWMP described above.

The IID Water Conservation and Transfer Project EIR/EIS also assesses the anticipated effects resulting from FWS's issuance of an incidental take permit and approval of a HCP related to the implementation of the IID/SDCWA Water Conservation and Transfer Agreement. The Draft EIR/EIS (IID and USBR 2002) was released January 2002. As indicated in section 1.1, the Secretary will make a final decision on the IID Water Conservation and Transfer Project EIR/EIS concurrent with this EIS. The Final EIS/EIR was filed with the EPA on " " 2002 and noticed in the *Federal Register* on " " 2002.

1.5.2 Geographically Related Projects

Lower Colorado River Multi-Species Conservation Program

The Lower Colorado River Multi-Species Conservation Program (MSCP) is a partnership of State, Federal, Tribal, and other public and private stakeholders with an interest in managing the water and related resources of the Colorado River in the Lower Basin. The underlying need for the MSCP is to implement a conservation plan that enhances the status of protected species and provides the basis for incidental take authorizations under the Federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA), as amended, for ongoing operations and maintenance and proposed future operations of the lower portion of the Colorado River.

The purpose of the MSCP is to develop a Conservation Plan that will provide the following:

- *Conserve habitat and work toward the recovery of "covered species" within the historic floodplain of the Lower Colorado River, pursuant to the ESA and attempt to reduce the likelihood of additional species listings under the ESA; and*
- *Accommodate current water diversions and power production and optimize opportunities for future water and power development, to the extent consistent with law.*

The MSCP covers the mainstem of the lower portion of the Colorado River from below Glen Canyon Dam to the Southerly International Boundary (SIB) with Mexico. The program area includes the historic floodplain and reservoir full-pool elevations. Specific conservation measures are being developed in the following categories:

- *Protection of existing habitat;*
- *Enhancement of existing habitat;*
- *Restoration to create new habitat;*
- *Management of habitat to maintain and preserve ecological functions;*

- *Avoidance and minimization of direct impacts on individuals and populations of covered species; and*
- *Population enhancement measures that directly or indirectly increase population levels of covered species.*

Conservation measures would be implemented over a 50-year period and would focus on the lower portion of the Colorado River from Lake Mead to SIB. The MSCP is intended to cover any incidental take associated with a number of actions, including changes in point of diversion of up to 1.574 MAF of Colorado River water from below Parker Dam. This volume was based on a series of conceptual transfers and changes in points of diversion that would maintain full aqueducts to urban users and provide water for anticipated Federal programs. With the exception of the 400 KAFY change in point of diversion addressed in the BO, none of the conceptual "covered projects" are proposed and considered reasonably foreseeable from a CEQA perspective. An EIS/EIR is being prepared to analyze the impacts of the MSCP Conservation Plan. Reclamation and FWS are the lead agencies under NEPA, and MWD is the lead agency under CEQA.

Salton Sea Restoration Project

As described in the Salton Sea Restoration Project (SSRP) Draft EIS/EIR (USBR and Salton Sea Authority [SSA] 2000), the Salton Sea currently is an excessively saline, nutrient-rich lake in a closed basin. The Sea was formed by an accidental breach of an irrigation structure in 1905, which resulted in an uncontrolled flow from the Colorado River into the basin for 18 months. The Salton Sea is sustained by drainage from agricultural operations in the Imperial Valley. In discussing the legislation to reclaim the Salton Sea, House Report No. 105-621, released on July 14, 1998 by the U.S. House of Representatives Committee on Resources, states the following:

> Land, recreational, and ecological values associated with the Sea have declined over the last decade, due in large part to the rising salinity and surface elevation. Without efforts to reduce and stabilize the salinity level, it will continue to rise and will have severe impacts on the existing fish and wildlife resources, as well as causing odor and land value impacts.

The Salton Sea Reclamation Act of 1998 (Public Law 105-372), developed in response to these conditions, directs the Secretary to do the following:

> …complete all studies, including, but not limited to environmental and other reviews, of the feasibility and benefit-cost of various options that permit the continued use of the Salton Sea as a reservoir for irrigation drainage and (i) reduce and stabilize the overall salinity of the Salton Sea; (ii) stabilize the surface elevation of the Salton Sea; (iii) reclaim, in the long term, healthy fish and wildlife resources and their habitats; and (iv) enhance the potential for recreational uses and economic development of the Salton Sea.

The Salton Sea study is separate from the proposed action, and can proceed with or without the proposed IA. PL 105-372 specifically directs the Secretary not to include any option that (1) relies on the importation of any new or additional water from the Colorado River; or (2) is not consistent with existing rights and obligations of persons under treaties, laws, decrees, contracts, and agreements that make up the Law of the River. In furtherance of this limitation, PL 105-372 directs the Secretary to

> …apply assumptions regarding water inflows into the Salton Sea Basin that encourage water conservation, account for transfers of water out of the Salton Sea Basin, and are based on a likely maximum reduction in inflows into the Salton Sea Basin which could be 800,000 acre-feet or less per year.

House Report No. 105-621 specifically refers to efforts underway that would transfer between 130 and 300 KAFY of water from IID to SDCWA and acknowledges that this would reduce the inflow to the Sea.

To implement the directive provided in PL 105-372, the SSA, as the lead California agency under CEQA, and Reclamation, as the lead Federal agency under NEPA, released a Draft EIS/EIR in January 2000 (USBR and SSA 2000), which evaluated alternative methods of restoring the Salton Sea. A Supplemental Draft EIS/EIR that includes different alternatives and revised modeling and impact analysis is now being prepared. Alternatives that are currently being considered for inclusion in the Supplemental Draft EIS/EIR include No Action; Evaporation Ponds; Enhanced Evaporation System (EES) at Bombay Beach; EES at Salton Sea Test Base; Evaporation Ponds and EES; and In-Sea EES in Evaporation Ponds. These alternatives are presented in an alternatives report (scheduled to be released as early as July 2002) that will be made available to the public in advance of the Supplemental Draft EIS/EIR.

Rule for Offstream Storage of Colorado River Water

Reclamation developed, and the Department of the Interior (DOI) adopted, a rule to facilitate interstate contractual distribution of Colorado River water among Arizona, California, and Nevada (Lower Division States). Reclamation prepared an Environmental Assessment (EA) to assess the environmental impacts of the rule, and a Finding of No Significant Impact was issued on October 1, 1999. The final rule was published in the *Federal Register* on November 1, 1999 and became effective December 1, 1999. It establishes a procedural framework for an expressly authorized storing entity to enter into storage agreements with authorized entities in Consuming States to store Colorado River water offstream. Under the agreements, the Storing State will use water it stores under an interstate agreement and, in return, decrease its consumptive use of Colorado River water, thereby developing "Intentionally Created Unused Apportionment" (ICUA) that the Secretary will release for consumptive use in the Consuming State.

The Arizona Water Banking Authority (AWBA) has entered into an initial interstate banking agreement with SNWA and the Colorado River Commission of Nevada (CRC) under which Colorado River water will be stored by AWBA for the benefit of Nevada. AWBA, SNWA, CRC, and Reclamation are developing a Storage and Interstate Release Agreement that will cover the actions to be taken by the U.S. AWBA is developing a third agreement with CAWCD for Development of ICUA under which Arizona will be committed to reduce its consumptive use of Colorado River water when water is recovered from offstream storage. Under these agreements, when, in the future, SNWA wants to receive the benefit of the stored water, AWBA will recover the stored water that will be used in Arizona, permitting CAWCD to reduce its consumptive use of Colorado River water, thereby allowing the Secretary to release the ICUA to SNWA under Article II (B)(6) of the Decree.

Reclamation adopted a programmatic approach to environmental compliance for the Offstream Storage Rule because many of the details of specific agreements under the rule were unknown at that time, such as conveyance, storage, and forbearance. Accordingly, Reclamation prepared a final programmatic environmental assessment (FPEA), dated November 1999, for the Offstream Storage Rule, which analyzed the most likely scenario that AWBA would store 1.2 MAF of Colorado River water offstream in Arizona for the benefit of SNWA. In the rule, Reclamation committed to complete environmental compliance documentation and appropriate consultations before executing a specific Agreement. Accordingly, Reclamation and SNWA jointly prepared an associated draft environmental assessment (DEA), dated February 17, 2002, that analyzes the potential impacts of the storage and retrieval actions that will occur under the Agreement. Under this proposed agreement, AWBA will store up to 1.2 MAF of recoverable water in its groundwater aquifers for the benefit of SNWA. Water is expected to be stored between 2002-2016, at a maximum annual rate of 100 KAF per year. The specific schedule for retrieval of stored water and delivery of ICUA is unknown because it is dependent upon several factors, including actual demands, available water resources, and conditions on the Colorado River. However, under Arizona law, the maximum quantity of ICUA that can be developed for interstate use in any given year is 100 KAFY. The FPEA for the rule identified and analyzed retrieval of water at this maximum rate of recovery. Under the ISG, if there are full surplus conditions on the Colorado River (Lake Mead elevation at or above 1,145 feet msl), SNWA may not need to utilize the ICUA until sometime after 2016. However, if there is limited or no surplus water available (Lake Mead elevation at or below 1,145 feet msl), SNWA may need to begin utilizing some of the ICUA as early as 2006. SNWA estimates the maximum annual retrieval of ICUA would be approximately 79 KAFY in the year 2025. SNWA's estimated schedule for diversion and consumptive use of ICUA in Nevada is provided in Table 2 attached to the DEA dated March 17, 2002.

Colorado River Basin Salinity Control Program

Pursuant to section 303 of the Clean Water Act of 1972, the EPA promulgated regulations requiring water quality standards for salinity, numeric criteria and a plan of implementation for salinity control. The Seven Colorado River Basin States, acting through the Colorado River Basin Salinity Control Forum, adopted and the EPA approved numeric criteria for flow-weighted average annual salinity.

Based on past and projected future water development, the Colorado River Basin Salinity Control Forum determined that 1,477,700 tons of salt must be removed or prevented from entering the system annually to maintain the numeric criteria through 2015 (DOI 1999). The plan of implementation includes projects that remove the required salt tonnage. To meet the goal of 1.48 million tons of salinity control through 2015, it will be necessary to fund and implement potential new measures that ensure the removal of an additional 756,000 tons annually.

This action is pursuant to Title II of the 1974 Colorado River Basin Salinity Control Act, Public Law 93-320, as amended. Title I of this act provides for the construction, operation, and maintenance of salinity control projects in the Colorado River Basin. A wide range of salinity control actions has been undertaken in the Colorado River Basin as part of these programs. These actions include salinity control activities on U.S. Bureau of Land Management (BLM) land, a voluntary on-farm salinity control program by the U.S. Department of Agriculture (USDA), and a broad range of activities implemented by Reclamation. Reclamation projects include deep well injection of natural brines, irrigation efficiency projects, well plugging, and other projects that are found to be cost effective in Reclamation's competitive funding process.

Land Management, Crop Rotation, and Water Supply Program in the Palo Verde Valley

MWD and the PVID are developing a land management, crop rotation, and water supply program in the Palo Verde Valley. The program's objective is to develop a flexible and reliable water supply for MWD of approximately 100 KAFY for 35 years and to assist in stabilizing the farm economy within the Palo Verde Valley through sign-up payments and annual payments for participating farmers and through implementation of specific community improvement programs. Participation in the program would be voluntary. Participating farmers would, at MWD's request and with specific notice periods, not irrigate a portion of their farmland. The same land would not be irrigated for a minimum of a 1-year term and a maximum of a 5-year term at the farmer's option. A base area of 6,000 acres would not be irrigated each year of the 35 years. MWD would have the option to increase the non-irrigated area from 6,000 acres up to a maximum of 26,500 acres per year. Overall, a maximum of 24,000 acres per year in any 25-year period or 26,500 acres per year in any 10-year period during the 35-year program would be dedicated to the program. MWD would provide financial compensation to the participants. Not irrigating a portion of the Palo Verde Valley's farmland would result in less Colorado River water being used by PVID. The amount of water conserved by the Program would be determined on an annual basis. An EIR assessing the impacts of this program was released by PVID in May 2002.

Total Maximum Daily Load Program

Pursuant to the requirements of the Clean Water Act, the Colorado River Regional Board identified and ranked "impaired waterbodies" for which total maximum daily loads (TMDLs) need to be established. The Board will develop and adopt an Implementation Plan for each TMDL/water body combination and identify implementing actions, monitoring and surveillance for compliance, and technical and economic feasibility. The Regional Water Quality Control Board (RWQCB) has identified the Salton Sea and its tributaries (i.e., New River, Alamo River, Imperial Valley drains, Palo Verde outfall drain, Coachella Valley Stormwater Channel [CVSC]) as quality limited waters. The Salton Sea Watershed has also been identified as a priority watershed.

Brawley, California Constructed Wetlands Demonstration Project

The Brawley Constructed Wetlands Demonstration Project (Brawley Wetlands Project) involves the construction of two pilot treatment wetlands to improve water quality in the Imperial Valley's agricultural drains, the New River, and the Salton Sea. A 5-acre wetland has been constructed on a 7-acre site near the city of Brawley, which is designed to divert and improve the quality of approximately 2.4 million gallons of New River water per year. A second, larger wetland (40 acres) has been constructed on a 68-acre site near the City of Imperial. This 40-acre wetland would collect 6.9 million gallons of agricultural water per year from IID's Agricultural Rice 3 Drain. Both wetlands are designed to remove silt from inflows passing through a sedimentation basin and reduce nutrient loads, pesticide/herbicide toxicity, and selenium concentrations as water flows through a series of shallow ponds. A monitoring program has been underway for over 6 months. The purpose of the monitoring program is to determine relative water quality improvement and the effects on wildlife (SSA and Reclamation 2000).

1.6 RELATED DOCUMENTS

As discussed above, a number of projects are related to the actions considered in this EIS. These projects and the associated environmental documentation are discussed above under section 1.5.1. This EIS tiers to and incorporates by reference the information contained in the documents listed below.

- *QSA PEIR*
- *IID Water Conservation and Transfer Project EIR/EIS*

The documents described below were previously completed and are on file at the following locations:

U.S. Bureau of Reclamation Lower Colorado Region 500 Date Street Boulder City, NV 89006-1470 (702) 293-8414	U.S. Bureau of Reclamation Phoenix Area Office (PXAO) 2222 W. Dunlap Ave., Suite 100 Phoenix, AZ 85021 (602) 216-3999	U.S. Bureau of Reclamation Southern California Area Office 27710 Jefferson Ave., Suite 201 Temecula, CA 92590 (909) 695-5310

All-American Canal Lining Project Final EIS/EIR

Reclamation prepared a Final EIS/EIR for the AAC Lining Project in March 1994 (USBR and IID 1994). This EIS/EIR states that the preferred alternative for reducing seepage from the AAC would conserve approximately 67.7 KAFY. The Final EIS/EIR was filed with the EPA on April 14, 1994 and noticed in the *Federal Register* on April 19, 1994. A ROD was prepared and signed by the Lower Colorado Region's Regional Director on July 29, 1994. On November 22, 1999, Reclamation determined that the EIS and the ROD continued to meet the requirements of NEPA.

Coachella Canal Lining Project Final EIS/EIR

A revised and updated Draft EIS/EIR for the Coachella Canal Lining Project was circulated for public review by Reclamation and CVWD in September 2000; a Final EIS/EIR was released in April 2001, the Final EIR was certified by CVWD in May 2001. A ROD was prepared and signed by the Lower Colorado Region's Regional Director on March 27, 2002. This project is described in section 1.5 above. As noted, use of the conserved water from this project is being assessed in the IA EIS. The Final EIS/EIR is available from CVWD, Highway 111 at Avenue 52, Coachella, CA 92236.

Final PEIR on the Implementation of a Water Conservation Program by the Imperial Irrigation District and the Potential Initial Transfer of 100 KAFY of Conserved Water

A Final PEIR on the Implementation of a Water Conservation Program by the Imperial Irrigation District and the Potential Initial Transfer of 100 KAFY of Conserved Water was prepared in 1986 by IID. This document evaluates impacts associated with the existing water conservation program agreed to in the *Agreement for Implementation of a Water Conservation Program and Use of Conserved Water* (IID/MWD 1988 Agreement). Two additional agreements were implemented in 1989: (1) the IID/MWD/PVID/CVWD 1989 Approval Agreement, which represents the approval of CVWD and PVID to the IID/MWD 1988 Agreement, and 2) the MWD/CVWD 1989 Agreement to Supplement Approval Agreement, which deals with a limitation on CVWD's net Colorado River diversions and the circumstances under which MWD would reduce its use of conserved water. The terms of the three agreements extend for a minimum of 35 years after full implementation of the conservation program and continue until terminated. As described in Chapter 2, under the terms of the QSA, the amounts of water available to MWD and CVWD under these agreements would be modified. Implementation of the IA would commit the Secretary to deliver 20 KAFY to CVWD. The PEIR and agreements are available at IID Headquarters, 333 East Barioni Blvd., Imperial, CA 92251 or at MWD Headquarters, 700 N. Alameda St., Los Angeles, CA 90012.

Final EIR for Modified East Lowline and Trifolium Interceptors, and Completion Projects

It was initially assumed that the 14 projects approved as part of the 1986 PEIR described immediately above would adequately meet the conservation terms of the IID/MWD 1988 Agreement and subsequent agreements between IID and MWD. It was subsequently determined, however, that additional measures would be needed. The Final EIR for Modified East Lowline and Trifolium Interceptors, and Completion Projects (IID 1994) assesses the impacts of water conservation projects, including two new lateral interceptor systems (lined canals that extend across the lower reaches of lateral canals to capture unused flows) and a set of 13 potential "completion projects," such as additional lateral interceptor systems, seepage recovery, canal/lateral lining, water conservation/flood control through land retirement, and new reservoir construction. The IID Board of Directors certified the Final EIR on June 7, 1994. The Final EIR is available at IID Headquarters, 333 East Barioni Blvd., Imperial, CA 92251.

1.7 PUBLIC INVOLVEMENT AND SCOPING PROCESS

On January 18, 2001, Reclamation published a *Federal Register* Notice of Public Comment Period on a proposed policy that would identify inadvertent overruns, and define subsequent payback requirements to the Colorado River mainstream. On March 9, 2001, a second *Federal Register* notice was published, extending the public comment period to April 10, 2001. Sixteen letters of comment were received by Reclamation on the proposed IOP. Also on March 9, 2001, Reclamation published in the *Federal Register* a Notice of Intent (NOI) to prepare an EIS and initiation of scoping process for the IA, IOP, and implementation of the biological conservation measures. The scoping comment period also ended April 10, 2001. Six letters of comment were received in response to the NOI. Comments addressed a number of issues, including the following:

- *Project description (the need for flexibility to accommodate future shifts in water policy and consideration of in-stream and other public interest beneficial uses in long-term water resource planning; the need for detailed descriptions of implementation, monitoring, and enforcement strategies).*
- *EIS content (the geographic scope of the analysis and the need to identify the relationship of the proposed action to all major proposed and related Federal and State actions along the lower portion of the Colorado River; specific resources to be analyzed; the need for a detailed mitigation plan; the need to include sufficient information and analysis from documents incorporated by reference; the need for an appropriate baseline and no-action scenario).*
- *Expansion of the range of project alternatives.*
- *The need for compliance with the ESA.*

On April 26, 2001, a separate letter was sent to 55 Indian Tribal representatives, initiating government-to-government coordination pursuant to CEQ Regulations for Implementing the

Procedural Provisions of the NEPA (40 CFR 1500-1508, § 1501.7); the National Historic Preservation Act (§ 101[d][2]) (16 U.S.C. § 470f), the new Section 106 regulations, "Protection of Historic Properties" (36 CFR Part 800.2[c][2]); and Executive Order 13175 of November 6, 2000, pertaining to consultation and coordination with Indian Tribal governments. The only comment letter received in response to this letter was from the Fort Mojave Indian Tribe, which requested that it be placed on the distribution list for the EIS. No concerns or issues were raised in this letter.

On February 15, 2001, Reclamation staff met with members of seven interested environmental groups at their request to discuss the proposed IOP. In addition, informal discussions and a meeting on March 22, 2001, were held with representatives of the Colorado River Basin States to discuss the technical details of the proposed IOP. A conference call to discuss these technical aspects was held with the same seven environmental groups on April 3, 2001. Coordination with the FWS pursuant to the Fish and Wildlife Coordination Act was initiated in April 2001, and several meetings and informal discussions were carried out. Extensive coordination with the FWS had been previously conducted pursuant to the Section 7 consultation on ISG and the IA. In August and September 2001, Reclamation met with the BIA and Colorado River Indian Tribes (CRIT) to review the impacts to power generation from the proposed water transfers. In addition, numerous meetings were held with the four affected California agencies regarding coordination of NEPA and CEQA compliance, and on July 26, 2001, Reclamation met with EPA staff to provide an overview of the proposed action. On November 7, 2001, Reclamation met with the Torres Martinez Band of Desert Cahuilla Indians to discuss potential impacts to the Salton Sea.

A scoping summary report was prepared to provide a synopsis of the scoping process conducted for the proposed action. The scoping summary report identifies efforts made to notify interested agencies, organizations, and individuals about the proposed action and to obtain input from those entities regarding the range of alternatives to be evaluated and the issues to be addressed in the EIS. The report also presents the major points made in the public comments received during the scoping process. The scoping summary report is available on Reclamation's Lower Colorado River Operations website at http://www.lc.usbr.gov.

An NOA was filed with the EPA on January 4, 2002, and was published in the *Federal Register* on January 15, 2002, for the draft EIS. The NOA effectively initiated a 60-day public review of the draft EIS. Reclamation agreed to extend the public review period by 14 days. The NOA for the public review extension was published in the *Federal Register* on March 15, 2002. Public hearings were held in Blythe, California; Henderson, Nevada; and Los Angeles, California on February 5, 6, and 7, 2002, respectively. Forty-one people attended the public hearing in Blythe, 14 in Henderson, and six in Los Angeles. Issues of concern presented during the public hearings included confusion over the project description, the process of the IOP payback, potential impacts to biological resources, and the water agreement between the U.S. and Mexico. The public comment review period ended on March 26, 2002. Comment letters received during the public review period and responses to those comments are provided in Chapter 11 of this EIS.

1.8 EIS ORGANIZATION AND APPROACH

The IA, IOP, and biological conservation measures are described in detail in Chapter 2 of this EIS; the affected environment, environmental impacts of these actions, and mitigation measures for potentially significant effects are described in Chapter 3 for each resource considered; and Chapter 4 includes other NEPA considerations, such as the regulatory framework, cumulative impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible and irretrievable commitments of resources. The remaining sections include a list of references and persons/agencies consulted; a glossary of technical terms; definitions of acronyms; a list of preparers; an index; a distribution list; and the comment letters and responses related to the draft EIS.

The EIS describes the direct impacts of the Federal action on the Colorado River, such as changes in flow and reservoir storage. The EIS also describes indirect, off-river impacts that would result from actions taken by the QSA participating agencies as a result of implementing the QSA. This is because the changes in water deliveries agreed to by the Secretary in the IA will enable the QSA to be fully implemented. It is important to recognize that while the EIS describes the indirect off-river impacts of actions taken by the QSA participating agencies, it does not "federalize" those actions, or create a requirement for supplemental NEPA compliance for those actions. The non-Federal actions carried out by the participating agencies pursuant to the QSA will need to comply with CEQA, CESA, and other State and local requirements. As noted above, a PEIR was prepared for the QSA, and an EIR/EIS was prepared for the IID Water Conservation and Transfer Project pursuant to these local requirements.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the proposed Federal action and its three components previously presented in section 1.1, the No-Action Alternative (i.e., the likely consequences of not implementing the Federal action), and other alternatives considered.

2.2 PROPOSED ACTION

The proposed action is the execution of the IA, adoption of the IOP, and implementation of the biological conservation measures.

2.2.1 Execution of the Implementation Agreement

The IA component of the proposed action contains terms and conditions pertaining to delivery of Colorado River water, which enable implementation of the QSA. Execution of the IA reflects the Secretary's approval of the QSA. For purposes of the analysis in this EIS, the IA includes all of the components of the QSA that relate to water transfers and changes in delivery of Colorado River water. The QSA is an agreement among CVWD, IID, and MWD to budget their portion of California's apportionment of Colorado River water among themselves, and to make available water conserved in the IID service area to SDCWA (these water agencies are collectively referred to as the participating agencies). The QSA quantifies, by agreement, the amount of Colorado River water available to the participating agencies and calls for specific, changed distribution of that water among the agencies for the next 75 years. This is referred to as the "quantification period" and extends for up to 75 years, from 2002 to 2077. The QSA is a major component of the California Plan (described in section 1.5) and is part of the means by which California would reduce its Colorado River water consumptive use to 4.4 MAF in a normal year. By approving the IA, the Secretary would agree to make Colorado River water deliveries to the participating agencies to implement this changed distribution. The agencies' service areas, as well as the affected portion of the Colorado River, are shown on the project location map (Figure 2.2-1). Table 2.2-1 lists the Federal actions associated with the QSA components and the various NEPA and/or CEQA documents that have been or are being prepared to address impacts of these components.

Implementation of the IA and QSA would not affect the delivery, distribution, and/or use of Colorado River water by the States of Arizona and Nevada; nor would the IA and QSA affect the delivery, distribution, and/or use of Colorado River water by the Upper Division States. Also, the IA and QSA would not affect Colorado River water deliveries to Mexico under the United States–Mexico Water Treaty of 1944 and other applicable agreements and would not affect the delivery, distribution, and/or use of Colorado River water within Mexico. Within the State of California, the IA and QSA would only affect the delivery, distribution, and/or use of Colorado

River water by the participating agencies (CVWD, IID, MWD, and SDCWA). The IA and QSA would not affect the delivery, distribution, and/or use of Colorado River water by other agencies within California that hold rights to Colorado River water under the Seven Party Agreement (i.e., Priorities 1, 2, 3b, 6b, and 7); nor would the IA and QSA affect the delivery, distribution, and/or use

Table

2.2-1 QSA Component, IA Federal Action and Associated Environmental Review

(7 pages)

Figure

2.2-1 Project Location

(color)

of Colorado River water by any PPR holders (including PPR holders in the States of Arizona and Nevada) as identified in the Decree, and supplemental Decrees.

Water Conservation, Transfers, and Exchanges

The cooperative and voluntary water conservation measures and transfers comprising the QSA play a critical role in California's ability to limit its use of Colorado River water to 4.4 MAF in a normal year. Execution of the IA commits the Secretary to make Colorado River water deliveries to the participating agencies according to the terms and conditions of the IA to enable implementation of the QSA.

The IA anticipates a transition period of approximately 25 years prior to full implementation of the water conservation/transfers and exchange projects. Many of the water conservation and transfer components of the IA and QSA would be implemented in a stepped, or phased fashion over a period of several years. For example, the water transfer under the IID/SDCWA Water Conservation and Transfer Agreement, as amended by the IA and QSA, would be expected to begin in 2002 and increase by 20 KAF yearly until full implementation under the IA and QSA between 2008 and 2011 (full implementation of this agreement, as amended by the IA and QSA is considered to be between 130 and 200 KAFY of water conserved in the IID service area and transferred to SDCWA). Full implementation of all IA and QSA water conservation and transfer components is expected in 2026, as shown on Figure 2.2-2.

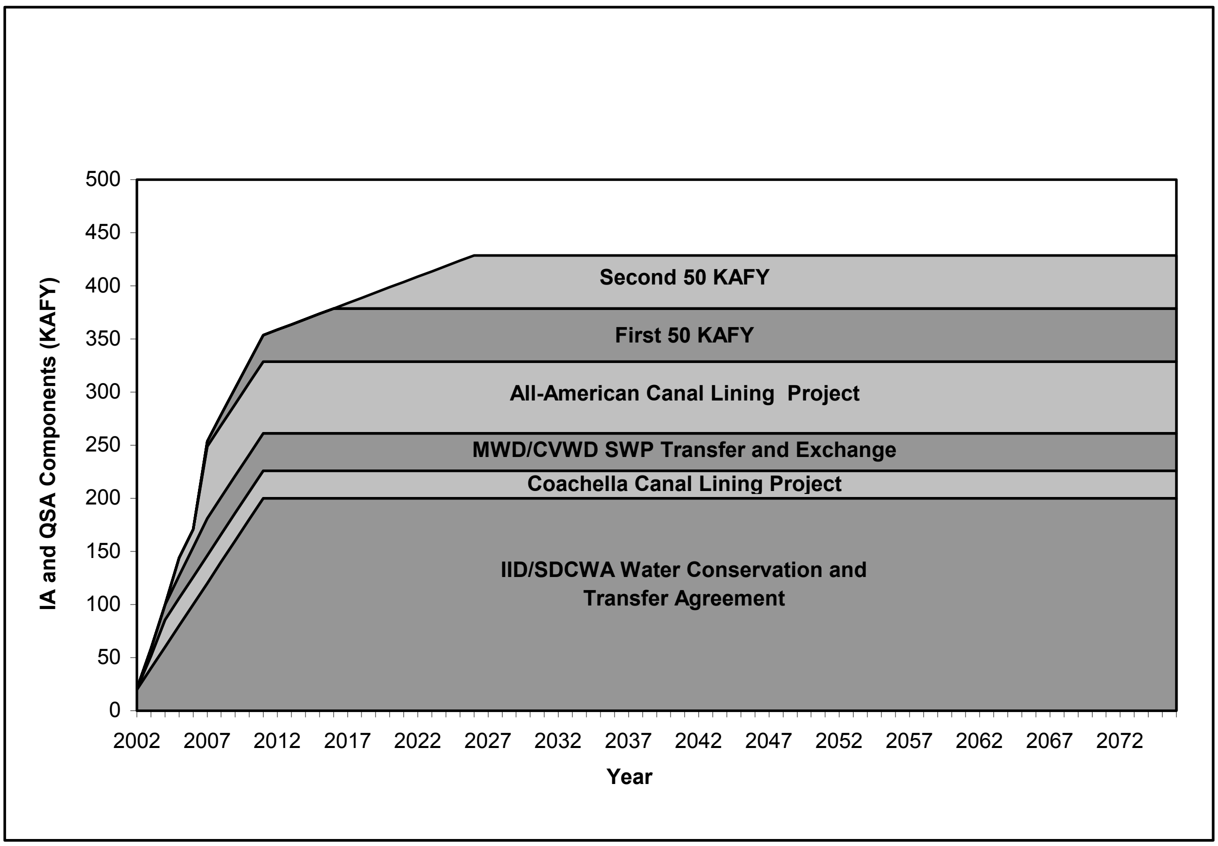

Figure 2.2-2. Timeline for Implementation of the Water Transfer Components of the IA and QSA

Water Conservation Measures

Cooperative and voluntary water conservation measures that are the basis of the IA consist of both agricultural conservation measures within the IID service area and conservation through reduction of canal seepage losses by lining sections of the AAC and Coachella Canal.

Conservation measures within the IID service area are expected to conserve up to 300 KAFY for transfer purposes. These measures could include both on-farm conservation and water delivery system improvements and may include fallowing, subject to certain contractual limitations set forth in the IID/SDCWA Water Conservation and Transfer Agreement. On-farm measures would improve the effectiveness and efficiency of irrigation by farmers. Water delivery system improvements would improve the effectiveness and efficiency of IID's water delivery system. IID is envisioning a flexible program that would permit the implementation of various methods of both on-farm conservation and water delivery system improvements to conserve water over the 75-year time period. The measures required to conserve water in the IID service area are evaluated on a programmatic level in this EIS. IID is preparing an HCP in support of IID's applications for incidental take permits in conformance with the ESA and CESA. NEPA and CEQA evaluations for the IID/SDCWA Water Conservation and Transfer Agreement and related HCP are provided by the IID Water Conservation and Transfer Project EIR/EIS (IID and USBR 2002).

Water conservation also would be achieved through lining sections of the AAC and Coachella Canal, which would reduce seepage from these canals. IID obtains water from the 82-mile long AAC, through which water is diverted from the Colorado River at Imperial Dam. It is estimated that 67.7 KAFY would be conserved by lining a 25-mile section of this canal (USBR and IID 1994). Transfers of water conserved by lining a section of the AAC would be expected to begin in 2005, with full implementation (67.7 KAFY conserved and transferred) in 2007. Environmental impacts of the AAC lining project were described in the All-American Canal Lining Project EIS/EIR (USBR and IID 1994). CVWD obtains water from the 122-mile long Coachella Canal, through which water is diverted from the AAC. Lining the remaining unlined portions of Coachella Canal would result in approximately 26 KAFY of conserved water available for transfer under the IA. Transfers of water conserved by lining the unlined portion of the Coachella Canal would be expected to begin in 2003, with full implementation (26 KAFY conserved and transferred) in 2006. The NEPA and CEQA compliance evaluations for the Coachella Canal lining project is provided in the Coachella Canal Lining Project EIS/EIR (USBR and CVWD 2001).

As noted above, construction of both the AAC and Coachella Canal lining projects have been covered under completed, separate NEPA analyses; therefore, the impacts of lining the canals are not addressed in this EIS. However, this EIS does consider impacts from the change in point of delivery of Colorado River water (from Imperial Dam to Lake Havasu) as a result of the canal lining projects specified in the IA and QSA.

Water Transfers

The water transfers are, for the most part, conserved Colorado River water from one area being made available to meet the needs of existing Colorado River water uses in another area, resulting in a net reduction in consumptive use of Colorado River water by users within the State of California. The following is a description of the various water conservation and transfer agreements that comprise the QSA and the associated actions under the IA.

IID/MWD 1988 AGREEMENT; IID/MWD/PVID/CVWD 1989 APPROVAL AGREEMENT; AND MWD/CVWD 1989 AGREEMENT TO SUPPLEMENT APPROVAL AGREEMENT

The IID/MWD 1988 Agreement (entitled "Agreement for Implementation of a Water Conservation Program and Use of Conserved Water," dated December 22, 1988) calls for MWD to bear the costs of various conservation projects implemented by IID within the IID service area. For bearing the costs, MWD is entitled to request and divert from the Colorado River an amount equal to the amount of water conserved by the conservation projects, estimated to range from 100 to 110 KAFY. Under the terms of the 1988 IID/MWD Agreement the conservation and transfer of water was to extend for a minimum of 35 years following completion of the last project implemented under the agreement, subject to certain conditions. The agreement provides no end-date, but rather the conservation and transfer of water continues until terminated voluntarily or by default by either party.

Water transfers under this agreement began in 1990, and reached full implementation in 1998. Environmental impacts of the IID/MWD 1988 Agreement are not addressed in this EIS, as impacts of this agreement are assessed under a completed, separate NEPA analysis, and the agreement has been fully implemented.

The IID/MWD/PVID/CVWD 1989 Approval Agreement, and the MWD/CVWD 1989 Agreement to Supplement Approval Agreement, amended the IID/MWD 1988 Agreement. The IID/MWD/PVID/CVWD 1989 Approval Agreement provided the approval from other Colorado River water contractors for the IID/MWD 1988 Agreement and specified certain circumstances under which MWD would have to forebear the use of a portion of the conserved water. The MWD/CVWD 1989 Agreement to Supplement Approval Agreement further specified the conditions under which MWD would forebear use of the conserved water and CVWD would be allowed the use of this water. Environmental impacts of the IID/MWD/PVID/CVWD 1989 Approval Agreement and the MWD/CVWD 1989 Agreement to Supplement Approval Agreement are not addressed in this EIS, as impacts of these agreements are assessed under a completed, separate NEPA analysis, and the agreements have been fully implemented.

Under the above agreements, MWD is entitled to request and divert from the Colorado River an amount of water equal to the amount of water conserved by the conservation projects within the IID service area. This amount is estimated to range from 100 to 110 KAFY. Under certain conditions, CVWD is entitled to up to 50 KAFY of this water. Since the above agreements were implemented, the conditions necessary for CVWD's diversion of 50 KAFY have not existed, and all water conserved under these agreements has been diverted by MWD. Therefore, in this EIS, the description of existing conditions assumes that the amount of water conserved and transferred under the above agreements is 110 KAFY and that all conserved water is used by MWD.

Under the terms of the IA and QSA, the IID/MWD 1988 Agreement, IID/MWD/PVID/CVWD 1989 Approval Agreement and MWD/CVWD 1989 Agreement to Supplement Approval Agreement would be amended so that MWD would be entitled to an annual maximum of 90 KAF, and CVWD would be entitled to an annual maximum of 20 KAF of water conserved by IID (therefore, CVWD would be entitled to annually divert 20 KAF in lieu of diverting 50 KAF only in years where the necessary conditions exist, as specified in the above agreements). Under the terms of the IA and QSA, the IID/MWD 1988 Agreement would also be amended to delete the parties' early termination rights after year 45, in order to maintain the IID/MWD 1988 Agreement and subsequent agreements, as modified, throughout the quantification period. Implementation of the IA would commit the Secretary to deliver this 20 KAFY to CVWD at Imperial Dam. Under the IA and QSA, CVWD would begin receiving 20 KAFY starting in 2003. This EIS provides the NEPA analysis of MWD's reduction in use of conserved water and for the change in point of delivery of 20 KAFY of Colorado River water from Lake Havasu to Imperial Dam. This EIS also provides the NEPA analysis of CVWD's use of the conserved water.

IID/SDCWA Water Conservation and Transfer Agreement

The IID/SDCWA Water Conservation and Transfer Agreement provides for the transfer of between 130 and 200 KAFY of water conserved by IID to SDCWA, plus an optional amount of an additional 100 KAFY. SDCWA would take delivery of the water at Lake Havasu. Implementation of the IA would commit the Secretary to deliver between 130 and 200 KAFY of water conserved by IID to SDCWA at Lake Havasu. Transfers of water under the IID/SDCWA Water Conservation and Transfer Agreement, as amended by the IA and QSA, would be expected to begin in 2002 and increase by 20 KAF yearly until full implementation under the IA and QSA between 2008 and 2011 (full implementation of this agreement, as amended by the IA and QSA, is considered to be between 130 and 200 KAFY). This EIS provides the NEPA analysis for the change in point of delivery of Colorado River water from Imperial Dam to Lake Havasu associated with the IID/SDCWA Water Conservation and Transfer Agreement. This EIS provides the programmatic NEPA analysis for other related actions including IID's water conservation program, the transfer of conserved water to SDCWA, and use of conserved water by SDCWA related to the IID/SDCWA Water Conservation and Transfer Agreement. NEPA and CEQA analysis for these actions are provided by the IID Water Conservation and Transfer Project EIR/EIS (IID and USBR 2002).

IID/SDCWA Early Water Transfers — Under the IID/SDCWA Water Conservation and Transfer Agreement, and associated agreements, IID would conserve and transfer Colorado River water to SDCWA in the following years and amounts: 2.5 KAF in 2005; 5 KAF in 2006; and 2.5 KAF in 2007. SDCWA would also receive a one-time transfer of 10 KAF from IID prior to full implementation of the IID/SDCWA Water Conservation and Transfer Agreement. This water is in addition to the water to be transferred to SDCWA under the IID/SDCWA Water Conservation and Transfer Agreement, although the total amount of water transferred to SDCWA would not cumulatively exceed 200 KAFY, including years with early water transfers.

MWD/SDCWA Exchange of Conserved Water Agreement

The MWD/SDCWA Exchange of Conserved Water Agreement provides the mechanism for exchanging the IID conserved and transferred water to SDCWA. SDCWA would take delivery of the IID conserved water at Lake Havasu. MWD would divert this water at the Whitsett Pumping Plant in Lake Havasu. MWD would then exchange with SDCWA, the water received under the IID/SDCWA Water Conservation and Transfer Agreement for an equivalent amount of water at the SDCWA/MWD delivery point in Northern San Diego County. A CEQA notice of exemption for this action was issued by SDCWA. No further environmental documentation is required. No Federal action is required to implement the MWD/SDCWA Exchange of Conserved Water Agreement.

CVWD/IID/MWD WATER CONSERVATION AND TRANSFER AGREEMENT (FIRST AND SECOND 50 KAFY)

Under the terms of the IA and QSA, the parties to the QSA would consent to the transfer of 130 to 200 KAFY to SDCWA pursuant to the IID/SDCWA Water Conservation and Transfer Agreement. The additional 100 KAFY, optional water to SDCWA identified in the IID/SDCWA Water Conservation and Transfer Agreement, would be replaced by what is referred to as the First and Second 50 KAFY transfers of conserved water to CVWD and/or MWD. CVWD would have the first option to acquire this conserved and transferred water and would divert this water at Imperial Dam. If CVWD chooses not to exercise part of or its full option to this water, MWD could exercise an option to divert this water at Lake Havasu. The First and Second 50 KAFY would be supplied by conservation measures implemented by IID from Year 1 to Year 45. After Year 45, the obligation to provide the Second 50 KAFY to CVWD would no longer be the obligation of IID, but would become the obligation of MWD. Transfers of water under the First 50 KAFY would be expected to begin in 2007, and increase by 5 KAF yearly until full implementation in 2016. Transfers of water under the Second 50 KAFY would begin in the year following the transfer of the full First 50 KAFY, which is expected to be 2017, and would increase by 5 KAF yearly until full implementation in 2026. The IA provides that the Secretary deliver this water to the agreed upon Colorado River water point of diversion for CVWD and/or MWD as described in the QSA.

MWD would also receive a “secondary option” to acquire from IID conserved and transferred water in the following years and amounts: 5 KAF in 2007, and 10 KAF each year from 2008 to 2014, as part of the CVWD/IID/MWD Water Conservation and Transfer Agreement. MWD would annually receive this “secondary option” water in the years specified above provided that the First 50 KAFY is transferred to MWD (i.e., in the event that CVWD elects not to take the First 50 KAFY in any year from 2007 to 2014, and the First 50 KAFY is transferred to MWD, MWD would receive both the First 50 KAFY and the secondary water). In the event that CVWD elects to take the First 50 KAFY in any year from 2007 to 2014, CVWD does not have an option to this secondary option water. This secondary option water is in addition to the amount of water that would be transferred to MWD under the First 50 KAFY, although the total amount of secondary water and the First 50 KAFY water transferred to MWD would not cumulatively exceed 50 KAFY.

Associated Early Water Agreements — Under associated agreements, IID would conserve and transfer Colorado River water (termed “early water”) to MWD in the following years and amounts: 2.5 KAF in 2005; 5 KAF in 2006; and, 2.5 KAF in 2007. This “early water” is in addition to the amount of water that would be transferred to MWD under the First 50 KAFY including the “secondary option water,” although the total amount of early water, secondary option water, and the First 50 KAFY water transferred to MWD would not cumulatively exceed 50 KAFY.

This EIS describes the environmental impacts based on available information, for the diversion and use of this water by CVWD and/or MWD. It also describes the impacts of the change in point of delivery from Imperial Dam to Lake Havasu in the event that MWD diverts all or a portion of the First and Second 50 KAFY. There is no change in point of delivery on the Colorado River associated with CVWD’s diversion of water conserved by IID.

After Year 45, the obligation to provide the Second 50 KAFY to CVWD would no longer be the obligation of IID, but would become the obligation of MWD. The source of this water and mechanisms for MWD to fulfill this obligation are speculative at this time and could be subject to further NEPA analysis in the future if Federal action or approval is required.

San Luis Rey Indian Water Rights Settlement

The San Luis Rey Indian Water Rights Settlement Act, enacted by Congress in 1988 (Title I of Public Law 100-675, as amended), authorized a settlement of water rights claims to San Luis Rey River water among the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, and the City of Escondido, the Escondido Mutual Water Company (which is no longer in existence) and Vista Irrigation District. This settlement is expected to be facilitated through the use of 11.5 KAFY of water conserved by the AAC lining project and 4.5 KAFY of water conserved by the Coachella Canal lining project. Under the IA, the Secretary would deliver this 16 KAFY of Priority 3a conserved Colorado River water to Lake Havasu. MWD would divert this water at the Whitsett Pumping Plant in Lake Havasu and would make water available for the benefit of the San Luis Rey Indian Water Rights Settlement Parties, in accordance with terms of a separate allocation agreement and a separate transportation agreement. MWD would then deliver an equivalent amount of water to SDCWA at the SDCWA/MWD delivery point in San Diego County. SDCWA would then deliver an equivalent amount of water to the San Luis Rey Indian Water Rights Settlement Parties. Transfers of water conserved by lining a section of the AAC are expected to begin in 2005, with full implementation in 2007. Transfers of water conserved by lining the unlined portion of the Coachella Canal are expected to begin in 2003, with full implementation in 2006.

This EIS evaluates the delivery, diversion and transport of water associated with this settlement, and use by the City of Escondido, and Vista Irrigation District. This EIS also provides the NEPA analysis for the change in point of delivery from Imperial Dam to Lake Havasu. Use of the water by the Indian bands is not included in this analysis and will require additional NEPA analyses if Federal action or approval is required. NEPA evaluations for the conservation of this water were included in the Coachella Canal Lining Project EIS/EIR and the All-American Canal Lining Project EIS/EIR.

Miscellaneous and Federal Present Perfected Rights

Under the IA and QSA, CVWD, IID, and MWD have agreed, when necessary, to divide responsibility for foregoing use of Colorado River water to permit the Secretary to satisfy the water demands by holders of Miscellaneous and Federal PPRs specified in Decree and supplemental Decrees, and not within the priorities contained in the Seven Party Agreement. When necessary, CVWD and IID would forbear 3 KAFY and 11.5 KAFY, respectively, for use by Miscellaneous and Federal PPRs. If needed, additional water would be forborne by MWD. Reclamation has estimated that MWD may eventually need to forbear up to approximately 47 KAFY, although the actual amount could vary. PPRs have more senior water rights and therefore are satisfied before water is allocated under the Seven Party Agreement. This EIS evaluates the change in water deliveries to CVWD, IID, and MWD, based on the use Colorado River water by Miscellaneous and Federal PPR holders. This EIS also evaluates the change in volumes of Colorado River water provided to CVWD, IID, and MWD. PPR holders currently use water at numerous locations along the Colorado River, and the specific locations of their diversions would not change under the IA and QSA.

MWD/CVWD SWP Transfer and Exchange Agreement

The IA and QSA include an exchange between CVWD and MWD involving water from the Colorado River and the SWP. The SWP is a large water supply, storage, and distribution system authorized by an act of the California State Legislature in 1959 and operated by the California Department of Water Resources (DWR). Currently, the SWP includes 32 storage facilities, reservoirs, and lakes; 17 pumping plants; three pumping-generating plants; five hydroelectric powerplants; and approximately 660 miles of aqueducts and pipelines. Total planned annual delivery from the SWP and total entitlements to SWP are approximately 4.1 MAFY. SWP deliveries from 1990 to 1999 varied from 0.55 MAFY to 3.4 MAFY. The primary purpose of the SWP is to distribute water to 29 urban and agricultural water contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, Central Coast, and Southern California.

The MWD/CVWD SWP Transfer and Exchange Agreement would facilitate a multifaceted exchange of SWP entitlement and Colorado River water deliveries. The individual actions are as follows:

- MWD would transfer 35 KAFY of its SWP entitlement to CVWD. This would reduce MWD's total SWP annual entitlement to 1,976.5 KAF and would increase CVWD's total annual entitlement to 58.1 KAF.

- CVWD would request and pay for SWP water deliveries via the existing system administered by DWR. The delivery would be made to MWD at the existing Devil Canyon Afterbay located south of Victorville, California.

- In exchange for the deliveries of SWP water requested by CVWD, MWD would arrange with Reclamation for the delivery of 35 KAFY of Colorado River water to CVWD. It is expected that the delivery would be made via the diversion structure at Imperial Dam to the AAC for diversion into the Coachella Canal. However, at MWD's option, it is also possible that the delivery could be made from the Colorado River Aqueduct (CRA) to CVWD.

If diverted at Imperial Dam, this exchange would result in the delivery and diversion of 35 KAFY of Colorado River water at Imperial Dam that would have otherwise been diverted at the MWD facility at Lake Havasu. If diverted at the MWD facility at Lake Havasu and delivered to CVWD, this exchange would not result in a change in point of delivery on the Colorado River as this water is currently being delivered to MWD. The MWD/CVWD SWP Transfer and Exchange Agreement is expected to begin in 2003 and be fully implemented in 2007. Environmental evaluations for the use of the water in the MWD and CVWD service areas, as well as for the change in point of delivery of Colorado River water from Lake Havasu to Imperial Dam is provided by this EIS.

MWD and CVWD requests for and DWR deliveries of SWP water vary from year to year depending on a variety of conditions, including anticipated demands within each SWP contractor's service area, and the anticipated supplies available from various sources. The 35 KAFY entitlement exchange would not affect current or anticipated water deliveries by the SWP. Diversions of water for the SWP system are consistent with State Water Resources Control Board orders, the ESA and CESA, and other regulations and agreements, as applicable.

SURPLUS DISTRIBUTION

If a surplus year is declared by the Secretary or unused Colorado River water apportionments are available to California users holding Priority 5a, 5b, 6a, 6b, and 7 water rights, the water would be used in accordance with the existing priority system, with the exception of Priority 6a water. Priority 6a water would be divided as follows: the first 38 KAFY would go to MWD, the next 63 KAFY would go to IID, and the remaining 119 KAFY would go to CVWD.

SHORTAGE DISTRIBUTION

Shortage conditions as defined by the IA and QSA would occur in years when there is less than 3.85 MAFY available to Priorities 1, 2, 3a, and 3b.[1] If IA shortage conditions occur, and less than 3.85 MAF of Colorado River water is available under Priorities 1, 2, 3a, and 3b in any one year during the 75-year quantification period, shortages would be shared pursuant to the particular provisions of the IA and the Acquisition Agreements. The Acquisition Agreements are collectively the IID/SDWCA Water Conservation and Transfer Agreement, the IID/SDCWA Early Water Transfer Agreement, the CVWD/MWD Acquisition Agreement, the IID/MWD Acquisition Agreement, the IID/CVWD Acquisition Agreement, and the MWD/CVWD SWP Transfer and Exchange Agreement.

Key Actions that Would Occur as a Result of Implementation of the IA

Under the IA, the Secretary would commit to certain actions required to facilitate implementation of the QSA. This section summarizes the key actions, by geographic area/service area, that would occur either directly or indirectly as a result of implementation of the IA and QSA and that could result in a change to the physical environment. Figure 2.2-3 illustrates the changed water deliveries with the implementation of the IA.

Colorado River

The IA would result in a change in the amount of water the Secretary would deliver to MWD's diversion point at Lake Havasu (above Parker Dam), and CVWD's and IID's diversion point at Imperial Dam. In a normal year, in aggregate, deliveries to Imperial Dam would be reduced by as little as 183 to as much as 388 KAF, and this water would instead be delivered to the MWD facility at Lake Havasu. Therefore, there would be a reduction in flow in the Colorado River between 183 and 388 KAFY from Parker to Imperial Dam.[2] The IA components that would reduce deliveries at Imperial Dam include the following:

- water conserved and transferred by IID (130 KAFY to 300 KAFY — minimum of 130 KAFY in the event that only 130 KAFY is transferred to SDCWA, and the First and Second 50 KAFY is transferred to CVWD — maximum of 300 KAFY in the event that the 200 KAFY is transferred to SDCWA and the First and Second 50 KAFY is transferred to MWD);

- reduced deliveries as a result of the AAC and Coachella Canal lining projects (together totaling 93.7 KAFY); and

- reduced deliveries by CVWD and IID to account for Miscellaneous and Federal PPRs (together totaling 14.5 KAFY).

Conversely, some IA components could increase deliveries at Imperial Dam, including the 20 KAFY transfer from MWD to CVWD per the amendments to the IID/MWD 1988 Agreement and subsequent amended agreements, and potentially the 35 KAFY transferred from MWD to CVWD

1. In this EIS, shortage conditions under the IA and QSA are referred to as "IA shortage conditions." Note that the IA shortage conditions are different than shortage years as defined by the Law of the River and specifically, the Decree. The IA, QSA, and QSA-related agreements, do not limit the Secretary's authority under Article II(B)(3) of the Decree.
2. Note that the conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAFY.

Figure

2.2-3 Changed Water Deliveries Under the IA per the MWD/CVWD SWP Transfer and Exchange Agreement, depending on where MWD elects to have the water delivered (Imperial Dam for diversion into the AAC and Coachella Canal or at Lake Havasu for diversion at the Whitsett Pumping Plant and delivery to CVWD). Table 2.2-2 outlines the various IA components that result in changes in River flows between Parker and Imperial Dams in a normal year.

Table 2.2-2. IA Anticipated Changes in River Flow from Parker to Imperial Dams in a Normal Year
(*negative numbers in parentheses*)

	Minimum (KAFY)	*Maximum (KAFY)*
Amendment to the IID/MWD 1988 Agreement/Subsequent Agreements	20	20
IID/SDCWA Conservation and Transfer	(130)	(200)
First and Second 50 KAFY	0	(100)
AAC Lining Project[1]	(67.7)	(67.7)
Coachella Canal Lining Project[1]	(26)	(26)
CVWD/MWD SWP Transfer and Exchange	35	0
Miscellaneous and Federal PPRs	(14.5)	(14.5)
Total	**(183.2)**	**(388.2)**

1. 11.5 KAFY and 4.5 KAFY from the AAC and Coachella Canal linings, respectively, would be made available for San Luis Rey Indian Water Rights Settlement Act purposes.

Imperial Irrigation District

Under the IA, IID would agree to limit its consumptive use of Colorado River water under Priority 3a to 3.1 MAFY for the quantification period, less the amount of water equal to that conserved by IID for the benefit of others as outlined in the IA and QSA, and subject to adjustment as proved in the IOP. This consensual limitation of Priority 3a consumptive use constitutes a forbearance of IID's right to divert, for beneficial use, up to the entire balance (after Priorities 1 and 2) of the 3.85 MAFY amount allocated in the aggregate to Priorities 1, 2 and 3. This forbearance increases the certainty of water available to agencies with lower priorities (or higher priority numbers). With the implementation of the IA and QSA, IID would conserve between 230 and 300 KAFY for transfer purposes (in addition to the 100 to 110 KAFY of conservation under the existing IID/MWD 1988 Agreement). Additional conservation by IID may be needed to comply with IID's consensual Priority 3a Colorado River water diversion cap and the IOP. IID anticipates implementing a variety of methods in different combinations in order to achieve the desired amount of conservation. These may include the following:

- *On-Farm Conservation Measures* – On-farm conservation measures would be implemented by individual landowners or farmers within the IID service area, and could include, although are not limited to use of tailwater return systems; cascading tailwater systems; level basins; shortening furrows/border strip improvements; narrow border strips; cutback irrigation techniques; laser-leveling of fields; multi-sloping of fields; and drip irrigation. On-farm conservation measures may also include on-farm irrigation management techniques such as irrigation scheduling, water measurement, soil moisture measurements, and use of additional farm labor.

- *Water Delivery System Improvements* – These would entail construction and/or modification of the infrastructure of IID's water distribution system, including, but not limited to lateral interceptors, reservoirs, seepage interceptors, and conveyance lining.

- *Fallowing* – Subject to certain contractual limitations set forth in the IID/SDCWA Water Conservation and Transfer Agreement, fallowing could be implemented within the IID service area by individual landowners or farmers, or by IID. Methods could include removal of land from agricultural production or reduction of multiple crops to fewer crops or a single crop for one or more growing seasons or for multiple years.

A more detailed description of these measures is included in the IID Water Conservation and Transfer Agreement Project EIR/EIS (IID and USBR 2002).

Coachella Valley Water District

Under the IA, CVWD would agree to limit its consumptive use of Colorado River water under Priority 3a to 330 KAFY for the quantification period, less the amount of water equal to that conserved by CVWD for the benefit of others as outlined in the IA and QSA, and subject to adjustment as proved in the IOP. CVWD also would receive Colorado River water and SWP water via transfers from both IID and MWD, resulting in an additional 55 to 155 KAFY of Colorado River water, of which 35 KAFY would be exchanged for SWP water. This water is part of the overall water supply addressed in the CVWMP (CVWD 2000a), which was prepared by CVWD to establish an overall program for managing its surface and groundwater resources in the future. The CVWMP involves a number of actions to reduce the current overdraft of groundwater in the Coachella Valley. The water delivered under the IA would be used to the benefit of Improvement District No. 1 (ID-1), which includes the lower portion of the Coachella Valley and a small portion of the Upper Valley. The Upper Valley consists of primarily open desert lands and resort areas, whereas the Lower Valley area is primarily agricultural land.

Under the IA, from between 55 and 155 KAFY of additional Colorado River and SWP water would replace current use of groundwater or would be used for direct groundwater recharge. This would involve the use of the existing canal and distribution systems and potential expansion of those systems. Construction of pumping stations and other facilities may also be required, along with recharge facilities for direct groundwater recharge. Construction of these facilities is evaluated in this EIS based on available information. The exact location of these facilities is not known at this stage of plan development, but two areas under consideration include the vicinity of Dike 4 (a flood control dike) and the Martinez Canyon alluvial fan located east of the community of Valerie Jean. Expansion of the distribution system and construction of the recharge project would be the subject of separate NEPA review once specific sites have been selected, since both sites under consideration would require construction of facilities that are on Federal land or otherwise involve Federal action(s).

Metropolitan Water District

In a year where only 4.4 MAFY of Colorado River water is available in the State of California, MWD is limited to 550 KAF of Priority 4 water, less the amount of water needed to satisfy PPRs, plus up to 110 KAF of water conserved by IID under the IID/MWD 1988 Agreement. Under the IA and in a normal year, MWD would receive up to 56.2 KAFY from the AAC Lining Project, 21.5 KAFY from the Coachella Canal Lining Project, and up to 100 KAFY from the First and Second 50 KAFY (in the event that CVWD elects not to take this water); under the IA and in a normal year, MWD would transfer 35 KAFY of Colorado River water to CVWD under the MWD/CVWD SWP Exchange and Transfer Agreement, and would transfer 20 KAFY to CVWD under the amended IID/MWD 1988 Agreement and subsequent amended agreements.

Under the IA and in a normal year, MWD would also divert into the CRA, between 130 to 200 KAFY of conserved IID water transferred to SDCWA and 16 KAFY to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act. The water that would be diverted as part of the San Luis Rey Indian Water Rights Settlement Act would result in a more secure water supply for the City of Escondido and/or Vista Irrigation District, which are part of the MWD service area.

Implementation of the IA would not require the construction of new MWD facilities or the modification of existing MWD facilities.

Under the IA and QSA, MWD would be responsible, pursuant to the IOP, for repayment of any overrun as a result of aggregate use by Priorities 1, 2, and 3b in excess of 420 KAFY. (These priorities are established by the 1931 Secretarial regulations incorporating the recommendations of the Seven Party Agreement to PVID [Priorities 1 and 3b] and the YPRD [Priority 2]). If Priorities 1, 2, and 3b used less than 420 KAFY, MWD would have the exclusive right to consumptively use any remaining water under these priorities until the net use of water reached 420 KAFY.

San Diego County Water Authority

SDCWA would receive 130 to 200 KAFY of Colorado River water conserved by IID. Implementation of the IA would not require the construction of new SDCWA facilities nor would the implementation of the IA require the modification of existing SDCWA facilities.

2.2.2 Adoption of an Inadvertent Overrun and Payback Policy

The IOP component of the proposed action includes adoption of a policy that would identify inadvertent overruns of Colorado River water, establish procedures that account for inadvertent overruns, and define subsequent payback requirements. The IOP would not be materially modified for a 30-year period. The IOP is a condition precedent to the IA and QSA; that is, the IOP must be in place prior to implementation of the IA and QSA. The IOP would be applicable to all lower Basin States' users with quantified entitlements but would not be applicable to Mexico. The complete text of the proposed IOP policy is included as Appendix I.

An inadvertent overrun is defined as Colorado River water that is diverted, pumped, or received by an entitlement holder in excess of the water user's entitlement for that year. The overrun is termed inadvertent because it is deemed to be beyond the control of the water user. The IOP applies to all quantified Colorado River water entitlements in the Lower Basin and can only be applied to quantified consumptive use entitlements or entitlements that would take the remaining quantity of a State's apportionment. A procedure has not been established for applying the IOP to unquantified Colorado River water entitlements since entitlements, that are not quantified, would have no baseline from which to make a determination that an overage occurred.[3]

Under the IOP, payback would be required to begin in the calendar year that immediately follows the release date of the Decree Accounting Record that reports inadvertent overruns for a Colorado River water user. Prior to the beginning of the calendar year, the user's water order, along with the payback plan, and the user's existing Reclamation-approved conservation plan would be submitted to Reclamation for review and approval within the normal 43 CFR 417 process. Reclamation would review the user's payback plan solely to assure that the plan would adequately result in water savings equal to their payback requirement. In their payback plan, the user would be required to demonstrate that the extra-ordinary measures are not part of any on-going measures intended to reduce use for a transfer. Under the 43 CFR 417 process, Reclamation would also determine the user's adjusted entitlement (entitlement - transfers - payback requirement) and require a water order that is consistent with the adjusted entitlement. The IOP includes the following provisions:

- Payback must be made only from water management measures that are above and beyond the normal consumptive use of water; actions must be taken to conserve water that otherwise would not return to the mainstream of the Colorado River and be available for beneficial consumptive use in the U.S. or to satisfy the United States–Mexico Water Treaty of 1944 obligation.

- Maximum cumulative inadvertent overrun accounts for individual entitlement holders are 10 percent of an entitlement holder's normal year consumptive use entitlement.

- The number of years within which an overrun, calculated from consumptive uses reported in final Decree accounting records, must be paid back, and the minimum payback required for each year shall be as follows:

  – In a year in which the Secretary makes a flood control release[4] or a space building release[5], any accumulated amount in the overrun account would be forgiven.

  – If the Secretary has declared a 70R[6] surplus in the AOP, any payback obligation would be deferred at the entitlement holder's option.

  – When Lake Mead's elevation is between the elevation for a 70R surplus declaration and elevation 1,125 feet above mean sea level (msl) on January 1 of the first year of payback, the payback obligation must be paid back in full within 3 years. The minimum payback the first year would be the greater of 20 percent of the individual entitlement holder's

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3. Unquantified Colorado River water entitlements are entitlements that specify the diversion of Colorado River water for irrigation of a certain acreage or specific area of land.
4. Flood control release is a release of water from Lake Mead for the purpose of meeting specific criteria as specified by the U.S. Army Corps of Engineers (USACE).
5. Space building release is a release of water from Lake Mead for the purpose of obtaining the required August 1 to January 1 available flood control storage space in Lake Mead as specified by the USACE.
6. The "R" Strategy is an operating strategy for distributing surplus water and avoiding spills. The R strategy assumes a particular percentile historical runoff, along with a normal year, or 7.5 MAF delivery to Lower Division States, for the next year. Applying these values to current reservoir storage, the projected reservoir storage at the end of next year is calculated. If the calculated space available at the end of next year is less than the space required by flood control criteria, then a surplus condition is determined to exist.

maximum allowable cumulative overrun account amount, or 33.3 percent of the total account balance.

– When Lake Mead's elevation is at or below elevation 1,125 feet above msl on January 1 of the first year of payback, the total account balance must be paid back in full in that calendar year.

2.2.3 Implementation of Biological Conservation Measures

This component of the proposed action involves implementation of the biological conservation measures identified in the BO. They were developed to fully compensate for impacts of the changes in point of delivery of Colorado River water that would occur under the IA.[7] This EIS addresses these measures programmatically. As detailed plans are developed and specific land disturbing activities are identified, Reclamation will determine and carry out supplemental NEPA compliance evaluations, as appropriate. The conservation measures related to the IA water transfers consist of the following:

1. Reclamation would stock 20,000 razorback suckers, 25 centimeters (cm) or greater in length, into the Colorado River between Parker and Imperial Dams. This would be a continuation of present efforts and would bring the total number of razorbacks of 25 cm or greater in length stocked below Parker Dam to 70,000. This would be completed by 2006.

2. Reclamation would restore or create 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam. This effort could include restoring existing decadent backwaters for which no on-going effort provides funding or responsibility for restoration, or the creation of new backwaters where water availability, access, and other considerations can be met. Maintenance of these backwaters for native fish and wildlife would be ensured for the life of the water transfers. This would be completed within 5 years of the first water transfers under the IA (excluding the on-going water transfer under the IID/MWD 1988 Agreement and subsequent agreements).

3. Reclamation would provide $50K in funding for the capture of wild-born or first generation (F1) bonytails from Lake Mohave to be incorporated into the broodstock for this species and/or to support rearing efforts at Achii Hanyo, a satellite rearing facility of Willow Beach National Fish Hatchery. These efforts would be funded for 5 years.

4. A two-tiered conservation plan has been developed to minimize potential effects to occupied willow flycatcher habitat that could result due to reduced flows on the Colorado River between Parker and Imperial Dams as water transfers and associated changes in point of delivery are implemented. The details of the Plan may be found below, and in the BO in Appendix E.

Backwaters

No specific location has been identified for the restoration or creation of the 44 acres of backwaters along the Colorado River between Parker and Imperial Dams. Identification and design of these

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7. The conservation measures evaluated in this EIS are related to the change in point of delivery of up to 400 KAFY while IA related changes in points of delivery may range up to 388 KAFY.

backwater habitats would be the subject of further site-specific studies and site-specific impacts would be addressed as further actions in subsequent NEPA evaluations, as deemed appropriate. Creation of the backwater habitat may involve dredging and other grading activities. These activities could include vegetation clearing, grading, and channel deepening. This backwater habitat restoration may be located in one area or may be scattered in several locations along the lower portion of the Colorado River. It is not expected that the backwater habitat restoration or creation would materially increase consumptive use of Colorado River water.

Two-Tiered Conservation Plan

The following discussion of the Two-Tiered Conservation Plan has been extracted directly from the January 2001 BO.

Tier One

The primary strategy of Tier One of the two-tiered conservation plan is to use management actions to prevent changes in the existing microhabitat and prey base of occupied willow flycatcher habitat. Reclamation would identify and monitor 372 acres of currently occupied habitat that may be affected by the water transfers and changes in point of delivery. Soil moisture would be monitored, and if soil moisture levels decrease, measures would be taken to maintain the monitored habitat. The monitoring program would be reviewed every 5 years to determine whether this is an appropriate level of effort to monitor the effects of the water transfer actions. Monitoring would continue for up to 5 years after implementation of all water transfer actions, unless it becomes part of a broader effort associated with other Reclamation recovery actions.

In addition, Reclamation would restore and maintain 372 acres of new replacement willow flycatcher habitat along the lower portion of the Colorado River. All 372 acres of new replacement would be in place within 5 years of the effective date of the IA.

Tier Two

A two-step contingency strategy would be initiated if Reclamation, in consultation with FWS, determines that management actions to prevent adverse changes to monitored habitat are no longer viable or would not be successful in maintaining “baseline” soil moisture conditions.

The two-step contingency strategy emphasizes replacement of the monitored habitat in Tier One impacted as a result of the IA. The status of willow flycatchers relative to success of recovery efforts along the lower portion of the Colorado River between Parker and Imperial Dams would form the primary basis for determining the level of habitat replacement under this strategy using the two approaches outlined below.

Flycatcher Status Improving: If it is determined that the number of flycatchers along the lower portion of the Colorado River is increasing appreciably when compared to the year 2000, then one acre would be restored and maintained for every one acre that is adversely impacted. In combination with the 372 acres of newly enhanced habitat established under Tier One, the maximum acreage conserved would be 744 acres, and no further replacement of acreage would be required.

Flycatcher Status is Stable or Decreasing: Step 1 — If it is determined that the willow flycatcher population along the lower portion of the Colorado River is exhibiting an appreciable downward trend that is likely attributable to habitat factors along the River, then two acres would be restored and maintained for every one acre of monitored habitat that is impacted for the first 186 acres. Under this step, Reclamation would replace up to a maximum of 372 additional acres. Step 2 — If, after implementing Step 1, additional acreage of the monitored habitat is affected, then Reclamation would addresses the following two questions:

1. Are flycatchers occupying the 372 acres of replacement habitat already being maintained under Tier One?

2. Are the flycatchers along the lower portion of the Colorado River exhibiting an appreciable upward trend?

If the answer to questions 1 or 2 is yes, Reclamation would have no further requirement to restore acreage. If the answer to both questions is no, Reclamation would restore and maintain two acres for every one acre of monitored habitat that is impacted by the IA for the remaining 186 acres of monitored habitat. Under this step, Reclamation would replace and maintain up to a maximum of 372 additional acres. Should it be necessary to implement all of the Tier Two steps (744 acres) in addition to the Tier One actions (372 acres), a total of 1,116 acres would be replaced and maintained.

No specific locations for these actions have been identified; therefore, site-specific impacts would be addressed in subsequent NEPA evaluations, as appropriate. For the purposes of this analysis, it is assumed that the habitat creation or restoration may include the following:

1. Removal of large stands of salt cedar by mechanical means and revegetation with willow and cottonwood seedlings. Irrigation and monitoring would be required to ensure the development of the habitat.

2. Creation of cottonwood-willow "islands" within areas dominated by salt cedar. These "islands" would be expected to increase the overall habitat suitability for willow flycatcher in the area. Irrigation and monitoring would be required to ensure the development of the habitat.

3. Conversion of agricultural areas to cottonwood-willow habitat. Irrigation and monitoring would also be required for this process.

The manner of delivering water for the implementation of the biological conservation measures (i.e., for irrigation of revegetated areas) has not been identified since this would be site-dependent. The source and use of water for implementation of the biological conservation measures would be evaluated in future NEPA analyses if deemed appropriate.

2.3 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the IA, IOP, and the biological conservation measures would not be implemented.

2.3.1 No Action for Implementation Agreement

Execution of the IA commits the Secretary to make Colorado River water deliveries to the participating agencies according to the terms and conditions of the IA to enable implementation of the QSA; execution of the IA is a condition precedent to the QSA. Therefore, under the No-Action Alternative, the QSA also would not be implemented. The Secretary would continue to make deliveries of Colorado River water subject to the Law of the River, including the existing priority system, Section 5 contracts, and determinations identified in the ISG ROD. Because the QSA components are interdependent and represent a negotiated compromise of differing agency positions, under the No-Action Alternative it is assumed that none of the QSA components would be jointly and consensually approved, constructed, or implemented by CVWD, IID, and MWD.

Significant unresolved issues would remain regarding how California would divide Colorado River water among the participating agencies so as to limit the State's normal year diversion of Colorado River water to 4.4 MAFY. This would involve a reduction of approximately 600 KAFY from the 1990 to 1999 average Colorado River water diversion for the State of California, as required by the Secretary (pursuant to the Decree, and the LROC, and in accordance with the California Limitation Act). Specific implications of the No-Action Alternative are as follows:

- The IID/MWD 1988 Agreement, IID/MWD/PVID/CVWD 1989 Approval Agreement, and MWD/CVWD 1989 Agreement to Supplement Approval Agreement which have been implemented, would continue;
- There would be no consensual implementation of the new, cooperative, voluntary management plans or programs for water conservation, exchanges or transfers among the parties to the IA, and additional funding to support further agricultural conservation would be subject to pending disputes;
- The structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, could lose $200 million in State funding and may not be implemented; therefore, there may not be water available from canal lining projects to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act;
- There would be no consensual agreement between CVWD, IID, and MWD to forego use of water to permit the Secretary to satisfy the water demands of holders of Miscellaneous and Federal PPRs not within the Priorities contained in the Seven Party Agreement, up to the amount of each PPR, whereby satisfaction of PPRs would otherwise reduce the amount of water available to the lowest priority user (which, in a normal year, would be MWD); and,
- In the event that California contractors have not executed the QSA by December 31, 2002, the Interim Surplus determinations identified in the ISG ROD will be suspended and surplus determinations will be based upon the 70R Strategy, until such time California completes all actions and complies with reductions in water use identified in Section 5(c) of the ISG ROD. Section 5(c) establishes benchmark quantities and dates for reductions in California agricultural usage, and states that in the event California has not reduced its use to meet the benchmark quantities, the Interim Surplus determinations identified in the ISG ROD will be suspended and determinations will be based on the 70R strategy. Section 5(c) also provides conditions regarding reinstatement of ISG surplus determinations if missed benchmarks are later met.

Defining a Reasonably Foreseeable Division of Colorado River Supply among California Agencies

The Seven Party Agreement established the relative priorities of Colorado River water use among various California agencies. Water delivery contracts between the U.S. and the various California public agencies or individuals provide for water storage and delivery from Lake Mead in excess of 5.362 MAFY. This 5.362 MAFY was the amount prioritized in the Seven Party Agreement and incorporated into the water delivery contracts. Some of the PPRs specified in the Decree and supplemental Decrees were not included in the Seven Party Agreement or subsequent water delivery contracts. PPRs have more senior water rights and therefore are satisfied before water is allocated under the Seven Party Agreement.

Under the No-Action Alternative, in a normal year, and in the event that there is no unused Arizona and Nevada apportionment, California would be required to reduce diversions from the Colorado River to the State's 4.4 MAFY apportionment. Significant issues related to how California would reduce diversions to the apportioned level would remain unresolved. There are currently no alternative consensual water budgets established for the No-Action Alternative that identify how California could achieve reductions in overall use of Colorado River water; it is likely that such issues would be resolved only after protracted conflict and litigation. It is also likely that attention would be focused on the reasonable and beneficial use of water.

In addition to the 4.4 MAFY apportionment in a normal year described earlier, California is entitled to 50 percent of the surplus water in the Lower Basin and water allocated to, but not used by, other States when such water is made available by the Secretary. The surplus water and the unused portion of Arizona's and Nevada's apportionment historically have been used by holders of California's Priority 5a and 5b (allocated to MWD) and Priority 6 (allocated to PVID, IID, and CVWD) as defined in the Seven Party Agreement, although in the event that this water is available in the future, it would be utilized pursuant to the Law of the River. Under the No-Action Alternative, the availability of water for California's Priority 5a and 5b (together totaling 662 KAFY) and Priority 6 (300 KAFY) users would be uncertain. Depending on hydrologic conditions, the Secretary may determine a surplus on the Colorado River consistent with Article III(3)(b) of the LROC and Article II(B)(2) of the Decree, and the ISG.

Under the No-Action Alternative, there would be no further quantification of Priority 3a water between CVWD and IID. In a normal year, Priorities 1, 2, 3a, and 3b, in combination, would be limited to 3.85 MAFY. In a normal year, MWD would be required to reduce Colorado River water diversions to 550 KAFY of Priority 4 water, less the amount of water needed to satisfy PPRs, and pursuant to the IID/MWD 1988 Agreement and subsequent agreements, could divert up to an additional 110 KAFY of water conserved by IID. In a normal year, and in the event that holders of Priorities 1 through 3 together use less than 3.85 MAFY, MWD may divert the remainder up to the State's cumulative diversion amount of 4.4 MAFY or up to MWD's Priority 5a and 5b apportionment of 662 KAFY. However, in a normal year, MWD's diversions may be reduced below the amounts specified above by the amount of Colorado River water diverted by PPRs in California that is not accounted for under Priorities 1, 2, 3a, and 3b. Colorado River water diversions to the State of California could be greater than 4.4 MAF in a normal year in the event that there is unused Arizona and Nevada apportionment; this water would be allocated to entities within the State of California pursuant to the Law of the River.

Under the No-Action Alternative, MWD would be able to draw upon the approximately 80 KAF MWD has stored in central Arizona under an agreement with the CAWCD and may also be able to draw, annually, up to 111 KAF from the PVID Land Management, Crop Rotation, and Water Supply Program; however, diversions of Colorado River water by MWD would still likely be less than MWD's historic diversions because surplus or unused apportionment water historically has been diverted to fill a portion of the CRA.

The Secretary would continue to complete annual review and approval of water orders from users of Colorado River water in the Lower Division States. This process would be completed pursuant to Title 43 CFR Part 417, to ensure that water orders are limited to amounts required for reasonable and beneficial use. Under the No-Action Alternative, it is likely that during normal years these reviews would be more detailed and involve greater scrutiny from Reclamation and interest by other Colorado River water users than in surplus years. In the absence of unused apportionment in the states of Arizona and Nevada, California would be required to reduce its use to 4.4 MAFY in a normal year. Past legal threats and challenges among California Colorado River water users related to reasonable and beneficial use would likely occur again in normal years under the No-Action Alternative.

Since the components of the IA and QSA are interdependent, under the No-Action Alternative, any transfer of conserved Colorado River water among California agencies would likely be subject to challenges and litigation with the attendant increased costs and uncertainty. Thus, opportunities for effectuating intra-California water transfers of Colorado River water would be diminished.

Defining Reasonably Foreseeable Agency Responses

Under the No-Action Alternative, there would be a decrease in Colorado River water supplies for CVWD, IID, MWD, and SDCWA. These agencies might undertake other actions to increase their overall water supply and its reliability, including increased water conservation, increased reliance on other existing water supplies such as the SWP or groundwater, or further development of new supplies through water recycling or desalination. If reliability is not increased through these types of actions, additional water conservation or water rationing programs might be required during years of normal and shortage conditions on the Colorado River.

Under the No-Action Alternative, each agency would also be expected to continue to implement projects already undertaken independent of the IA and QSA to increase water supply and reliability. However, additional new agency-specific projects responding to non-implementation of the IA and QSA and reduced water supply and reliability are speculative and, therefore, are not part of the No-Action Alternative.

2.3.2 No Action for Inadvertent Overrun Policy

Under the No-Action Alternative, the IOP would not be adopted, and the Secretary would enforce the obligations under the Decree to ensure that no Colorado River water user exceeds its entitlement amount. Diversions of Colorado River water are reported monthly for most water users, and Reclamation releases a monthly tabulation of the cumulative years diversions and return flows as discussed in section 1.2.3. Under the No-Action Alternative, Reclamation would enforce its obligations under the Decree, which may include reducing deliveries for those water users that would overrun based on diversions to date and projected diversions for the remainder of the year, and/or stopping deliveries for water users that are at their entitlement amount. However, due to the nature of measurement, reporting, and accounting practices, there would continue to be some level of inadvertent overruns. The Secretary may determine at a future date that there is a need for a policy to assure these are addressed in a consistent fashion.

2.3.3 No Action for Biological Conservation Measures

Under the No-Action Alternative, the applicable biological conservation measures identified in the BO would not be implemented. Reconsultation with FWS would be required to effectuate any additional water transfers.

2.4 ALTERNATIVES

2.4.1 Implementation Agreement Alternatives

Because the purpose of the proposed action is to provide Federal approval of an agreement negotiated among the California parties, no other action alternatives are being considered. The QSA is a consensual agreement among three parties (CVWD, IID, and MWD) that resolves longstanding disputes regarding the priority, use, and transferability of Colorado River water. The proposed IA reflects that consensual agreement. The IA and QSA have been developed in response to the Secretary's 1996 statement that California must implement a strategy to enable the State to limit its use of Colorado River water to 4.4 MAF during a normal year or develop the means to meet its water needs from sources that do not jeopardize the delivery of Colorado River water to other States. Development of a strategy to reduce California's diversions of Colorado River water is considered by the Secretary to be a prerequisite for Secretarial approval of any further cooperative Colorado River water transfers among California agencies. The other Colorado River Basin States are also aware of the implications of the IA and QSA, and are very interested in and supportive of California's progress in reducing its Colorado River water diversions.

2.4.2 Inadvertent Overrun Policy Alternatives

Many alternative concepts and issues were considered in the development of the proposed IOP. Much interest and many ideas were identified during the scoping process and in response to the draft policy published in the *Federal Register*. As a result of considering public comment, one additional IOP alternative has been developed, and is considered, along with the proposed action, in this EIS.

No Forgiveness During Flood Releases Alternative

The proposed IOP contains a provision that in a year during which the Secretary makes a flood control release or a space building release, any accumulated amount in an overrun account would be forgiven. The No-Forgiveness Alternative would eliminate that provision. Under this alternative, during a flood control or space building release year, the overrun account would be deferred, but not forgiven. Payback would resume in the next year when such releases are not scheduled. All other provisions would be the same as the proposed IOP.

2.4.3 Alternative Biological Conservation Measures

No alternatives to the biological conservation measures identified in the BO are considered in this EIS. These conservation measures, which were included by Reclamation in its BA, would be implemented by Reclamation as specified in the BO. If Reclamation were unable to implement these measures as proposed, reinitiated consultation with FWS would be required.

2.5 SUMMARY COMPARISON OF ALTERNATIVES

The potential impacts of the execution of the IA, adoption of the IOP, and implementation of the biological conservation measures are evaluated for the following resources in this EIS: Hydrology/Water Quality/Water Supply, Biological Resources, Hydroelectric Power, Land Use, Recreational Resources, Agricultural Resources, Socioeconomics, Environmental Justice, Cultural Resources, Tribal Resources, Air Quality, and Transboundary Impacts. Based on a resource-specific detailed analysis, Reclamation has determined that implementation of the proposed action would result in negligible impacts to the following resource areas: geology, soils, and mineral resources; noise; aesthetics; and public services. Therefore, these resource areas are not specifically addressed in this EIS. However, to the extent that an aspect of any of these resource areas may impact another resource, discussion had been incorporated.

Table 2.5-1 summarizes, by resource area, the potential impacts for each component of the proposed action.

Table

2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures

(29 pages)

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3.1 HYDROLOGY/WATER QUALITY/WATER SUPPLY

This chapter discusses the potential changes to hydrologic systems and facilities, water quality, and water supply associated with the implementation of the proposed IA, IOP, and biological conservation measures. Information in this section is based primarily on information provided by the potentially affected agencies, the CRB, the DWR, and Colorado River system operation modeling performed by Reclamation.

3.1.1 Affected Environment

The region of influence for hydrologic systems and facilities includes the Colorado River from Lake Powell to the SIB, the associated reservoirs, and related facilities potentially affected by the implementation of the IA, IOP, and biological conservation measures (refer to Figure 1.2-1 for a schematic of the Colorado River System). However, substantive hydrologic changes caused by the proposed action would occur only in certain portions of the Colorado River system, including the reservoirs of Lake Powell and Lake Mead, as well as the river reaches between Hoover Dam to Parker Dam and Parker Dam to Imperial Dam. Substantive changes are not anticipated in the river reach from Glen Canyon Dam to Lake Mead. No substantive changes are expected from the proposed action in the reach from Imperial Dam to Morelos Dam, with the exception of flood flows. Changes in flood flows are addressed under section 3.12, Transboundary Impacts. For brevity, only Lake Powell, Lake Mead and the river reaches between Hoover Dam to Imperial Dam are described in this section. Detailed information on anticipated effects to all Lower Basin river reaches is contained in Appendix G.

General Colorado River

Hydrology

The Colorado River in its entirety is approximately 1,400 miles long. As depicted in Figure 3.1-1, the natural flow is highly variable from year to year. For example, the natural flow at the Lees Ferry gaging station, located 17 river miles below Glen Canyon Dam and above Lee Ferry (the division point between the Upper and Lower Basins of the Colorado River), has varied annually from 5 MAF to 23.8 MAF (USBR 2000b). Even tributary flow is highly variable from year to year.

The size of the watershed and variability of the natural hydrologic system make managing the Colorado River a challenge. To better control and utilize waters of the Colorado River multiple dams, powerplants, and diversion structures have been constructed, some dating as far back as 1860. The overall system has ten major reservoirs that provide an aggregate of approximately 60 MAF of active storage.

Lower Basin dams include Hoover, Davis, Parker, Headgate Rock, Palo Verde Diversion, Imperial, and Laguna dams. Morelos Dam, located just below the NIB is the last dam on the Colorado River. Hoover Dam created Lake Mead and has up to 26.2 MAF of active storage. Davis Dam was constructed to re-regulate Hoover Dam

Figure

3.1-1 Natural Flows at Lees Ferry

b&w

releases to meet downstream needs and aid in the annual delivery of 1.5 MAF to Mexico. Parker Dam forms Lake Havasu from which water may be diverted by MWD, the CAP, and others. Imperial Dam, approximately 28 miles northeast of Yuma, Arizona is a diversion and desilting facility for the AAC and the Gila Gravity Main Canal. Morelos Dam is the primary delivery point for Colorado River water under the United States-Mexico Water Treaty of 1944. It is the operation of these reservoirs, particularly Lake Mead, that determine the existing hydrology in the Lower Basin. Detail on diversion facilities and their locations is provided in Figure 1.2-1 and section 1.2.4, System Reservoirs and Diversion Facilities.

Apportionment and Management of Water Supply

Apportionment and Management of water supply is discussed in detail in Chapter 1, sections 1.2.2, Law of the River, and section 1.2.3, Operation of the Colorado River, respectively.

Groundwater

Studies on "near-river" (within 400 feet) observation wells in the Yuma area, conducted in the 1970s, showed the influence of river elevation on near-river groundwater elevations. The Yuma area near-river groundwater level changes in response to river level change are considered to be representative of the groundwater response in the valleys below Parker Dam because of similar geohydrology. It is estimated that the water table drop under the nearest field to the river, irrigated with surface diverted river water, will be about one half the river elevation drop. In a non-irrigated reach, groundwater elevation drop is assumed to be equal to the river drop (personal communication, D. Watt, Reclamation, 2001).

Water Quality

SALINITY

The main water quality concern for the lower portion of the Colorado River is salinity/total dissolved solids (TDS). Factors influencing salinity levels include, regional geology, salinity levels in tributaries and other inflow sources, drainage from irrigation system return flows, municipal discharge, and concentration of salts due to evaporation and other losses. Approximately 47 percent of the salinity in the Colorado River System is from natural sources (DOI 1999). The remaining 53 percent is due to human activities including agricultural runoff, as well as industrial and municipal sources. The river increases in salinity from its headwaters to its mouth.

Salinity of the river has fluctuated significantly over the period of record 1941 to the present. Monthly salinity of the river below Glen Canyon Dam varied by as much as 1,000 milligrams per liter (mg/L) prior to the construction of Glen Canyon Dam in 1961. By the 1980s, that variation was reduced to about 200 mg/L due to the mixing and dampening effect of the large volume of storage in Lake Powell. Currently, below Hoover Dam the maximum monthly fluctuation in any year is approximately 50 mg/L.

In 1974, the Colorado River Basin Salinity Control Act was enacted with the purposes of (1) resolving salinity issues associated with United States-Mexico Water Treaty of 1944 deliveries; and (2) creating a salinity control program within the U.S. portion of the Colorado River Basin to maintain salinity standards. The Federal/State salinity control program is designed to maintain flow-weighted average annual salinity at or below the adopted numeric criteria. The program is not intended to counteract short-term salinity variations due to the highly variable flows caused by natural factors (DOI 2001).

Each of the Seven Basin States adopted and the EPA approved salinity standards for the Colorado River Basin, which include numeric criteria for flow-weighed average annual salinity for three points along the lower Colorado River:

- Below Hoover Dam, 723 mg/L;
- Below Parker Dam, 747 mg/L; and
- At Imperial Dam, 879 mg/L.

The implementation plan for these criteria included the construction of four salinity control units, the application of effluent limitations, the use of saline water whenever possible, and future studies.

The Colorado River Basin Salinity Control Forum reviews the standards (numeric criteria and plan of implementation) at least every three years and makes revisions to accommodate changes occurring in the Basin States, most recently in 1999. This review is conducted by the seven states of the Colorado River Basin, acting through the Forum, to meet the requirements of section 303 of the Clean Water Act. At each triennial review, the current and future water uses are analyzed for their impact on the salinity of the Colorado River, including projects proposed as part of Reclamation, USDA, and BLM salinity control programs. If needed, additional salinity control projects are added to the implementation plan to assure compliance with standards. The need for one or more additional salinity control projects is determined by monitoring the salinity of the river and making near-term projections of changes in diversions from and return flows to the river system. When an additional project is needed it is selected from a list of potential projects that have undergone feasibility investigation. In selecting a project, considerable weight is given to the relative cost-effectiveness of the project. Environmental feasibility is another factor considered. For example, the January 2001 Progress Report on Quality of Water Colorado River Basin identified 22 cost-effective projects that could be implemented between 1998 and 2002 that could control up to 416,834 tons per year of salinity (DOI 2001).

Below Imperial Dam salinity is a Federal issue. Per Minute No. 242 of the United States-Mexico Water Treaty of 1944, the U.S. must deliver water to Mexico with an average annual salinity concentration no greater than 115 parts per million (ppm) +/- 30 ppm over the average annual salinity concentration of the River at Imperial Dam.

The EPA primary drinking water standard for TDS is 500 mg/L, with a secondary standard of 1,000 mg/L. Higher salinity source water requires higher amounts of leaching (salt flushing) water during irrigation and may reduce agricultural productivity of some fruits and vegetables. Salinity concentrations greater than 500 mg/L substantially increase maintenance and operational costs of water systems as salt plugs and corrodes piping and fixtures.

SELENIUM

Selenium in the Colorado River naturally originates from shale sediment deposits along river tributaries. Within the river system, Lake Powell has the highest annual loading of dissolved selenium and the majority of selenium is thought to come from above Lake Powell. Selenium loads drop within Lake Powell and drop again as the Colorado River passes through downstream reservoirs. Due to this decline, it does not appear that selenium is added to the system in the Lower Basin (DOI 1999). Recent studies have indicated that selenium levels in the Lower Basin of the River and associated biota are below the DOI level of concern of 5 mg/L (USBR 2000b). Selenium is not considered a water quality problem in the lower portion of the Colorado River.

MERCURY

A USGS study of mercury and other contaminants found in fish and wildlife concluded that mercury is not a problem in the Yuma Valley; nor is mercury thought to be a problem upstream at Lake Mead. A study by the University of Nevada, Las Vegas found only one fish of approximately 300 sampled in Lake Mead with mercury levels greater than the FDA's 1.0 ppm level of concern and most fish sampled had less than 0.5 ppm (USBR 2000b).

PERCHLORATE

Ammonium perchlorate, the most common form of perchlorate contamination, is manufactured for use as an oxygen-adding component in solid propellant for rockets, missiles, and fireworks (EPA 1999, 2001a). Perchlorate contamination in surface waters has been given increasing scrutiny due to potential health effects on human thyroid function (EPA 1999, 2001a). With the development of analytical methods since 1997, perchlorate can now be detected at levels as low as 4 parts per billion (ppb). The use of new methods has allowed the identification of perchlorate in the water supply of over 15 million people in California, Nevada, and Arizona and in the surface or groundwater in another eleven States throughout the country (EPA 1999).

There is currently no Federal National Primary Drinking Water Regulation for perchlorate. Perchlorate is on the EPA's Safe Drinking Water Act's Contaminant Candidate List as of 1998 and the EPA has established 1 ppb as the provisional reference dose for adults (EPA 1999, 2001a; CA DHS 2002). California's Department of Health Services (CA DHS) has set 4 ppb as the action level for drinking water and has proposed 6 ppb as a public health goal (CA DHS 2002). The Nevada Division of Environmental Protection (NDEP) selected 18 ppb as the interim action level for drinking water. The Arizona Department of Health Services set a provisional Health Based Guidance Level of 31 ppb (US EPA 1999; USBR 2000b).

In California, perchlorate is considered to be an "unregulated chemical for which monitoring is required" (Title 22, California Code of Regulations §64450) (CA DHS 2001). CA DHS advises water utilities to remove drinking water supplies from service if they exceed the 4 ppb action level. If the contaminated source is not removed from service due to system demands and if drinking water that is provided by the utility exceeds the action level, CA DHS will advise the utility to arrange for public notification to its customers (EPA 2001a). The proposed 6 ppb public health goal is the level at which CA DHS feels the contaminant concentration in drinking water does not pose a significant risk to health (CA DHS 2002).

Reservoirs

Lake Powell

Lake Powell and Glen Canyon Dam are operated to make a minimum release of 8.23 MAF annually, although releases can be greater. Another objective in operating Lake Powell is to fill the reservoir each summer. Glen Canyon Dam and Lake Powell were designed to operate from a normal maximum water surface elevation of 3,700 feet msl to a minimum elevation of 3,490 feet msl, the minimum for efficient hydropower production. At elevation 3,695 feet msl the reservoir is considered essentially full. Marinas and boat ramps are operable at elevations greater than 3,612 feet msl. Since first reaching equalization storage with Lake Mead in 1974, the reservoir water level has fluctuated from a high of 3,708 feet msl to a low of approximately 3,612 feet msl.

Per the LROC, another objective in operating Lake Powell is to maintain, to the extent practicable, an equal amount of active storage in Lake Mead and Lake Powell. Because of this equalization provision, changes in Lake Mead, will, in some years, result in changes in annual release volumes from Lake Powell. Equalization is not required when there is insufficient storage in the Upper Basin per the CRBPA.

Lake Mead

Hoover Dam and Lake Mead are operated with the following three main priorities: (1) river regulation, improvement of navigation, and flood control; (2) irrigation and domestic uses, including the satisfaction of PPRs; and (3) electrical power production. The regulations set forth two primary flood control operations: (1) reserved floodwater space within Lake Mead, and (2) releases based on forecasted runoff. Lake Mead's uppermost 1.5 MAF of storage capacity, between elevations 1,219.6 and 1,229 feet msl, is allocated exclusively to control floods. Additional flood control space is required through the period August 1 through January 1; releases to create and maintain flood control space are limited to a maximum of 28,000 cubic feet per second (cfs).

In addition to flood control space, flood control releases are required when forecasted inflow exceeds probable available storage space at Lakes Mead and Powell, and allowable space in other Upper Basin reservoirs. This includes accounting for projected bank storage and evaporation losses at both lakes, plus net withdrawals from Lake Mead by water users. Releases are made in steps meant to retain power generation capacity and to protect the downstream river area.

Unless flood control is necessary, Hoover Dam is operated to meet downstream demands, at least 9.0 MAF annually, for consumptive use by the Lower Division States plus the United States' obligation under the United States-Mexico Water Treaty of 1944. Lake Mead provides the majority of the storage capacity for the Lower Basin. Within these operations, Hoover Dam releases are managed on an hourly basis to maximize the value of generated power by providing peaking during high-demand periods. This results in fluctuating flows through Hoover Dam that can range from 1,000 cfs to 49,000 cfs. The upper value is the maximum flow-through capacity through the powerplant at Hoover Dam (49,000 cfs). However, because these flows enter Lake Mohave downstream, the affected zone of fluctuation is only a few miles.

Lake Mead is the primary diversion point for the State of Nevada. About 90 percent of the State's 0.3 MAF apportionment is diverted five miles northwest of Hoover Dam at the SNWA Saddle Island facilities. The minimum Lake Mead water level necessary to operate the pumping units at SNWA's original intake facility is 1,050 feet msl. SNWA recently constructed a second pumping plant and the minimum Lake Mead water level required to operate this unit is 1,000 feet msl. The new SNWA intake provides only a portion of the capacity required by SNWA to meet its Lake Mead water supply needs. Therefore, the intake elevation of SNWA's original pumping plant is critical to its ability to divert its full Colorado River water entitlement.

In addition to SNWA's diversion, Boulder City and Basic Management, Inc. (BMI) also take water from Lake Mead for use in the Las Vegas area primarily for domestic purposes.

Related to power generation and water supply, there are several "key" Lake Mead water surface elevations. The first elevation is 1,083 feet msl, the minimum elevation for the effective generation of power. The second elevation is 1,050 feet msl, the minimum elevation required for the operation of SNWA's original intake facility. The final elevation is 1,000 feet msl, the elevation required for operation of SNWA's second intake. Historic Lake Mead low water levels have dropped to the minimum rated power elevation of 1,083 feet msl of the Hoover Powerplant during two periods (1954 to 1957 and 1965 to 1966). The maximum Lake Mead water surface elevation of approximately 1,225.6 feet msl occurred once, in 1983.

WATER QUALITY

Lake Mead has four large sub-basins, including Boulder, Virgin, Temple and Gregg. SNWA's Saddle Island intake facilities and the confluence of Lake Mead and the Las Vegas Wash both occur in the Boulder Basin (USBR 2000b). Due in large part to urban runoff from the Las Vegas Wash, Boulder Basin has the highest nutrient concentrations in the Lake Mead system (Paulson and Baker 1981). Flows from the wash doubled in volume between 1982 and 1997, increasing the probability that wash water could plume further into the Boulder Basin, retaining its identity and pollutant characteristics for a greater distance before mixing and diluting with reservoir water. There are concerns that given its close proximity to wash intrusion, the SNWA intake at Saddle Island could pick up urban runoff and other wastewater pollutants (La Bounty and Horn 1996).

The Las Vegas Wash Coordination Committee (LVWCC), a consortium of local, State, and Federal agencies, business owners and members of the public, has been tasked with the development and implementation of the Las Vegas Wash Comprehensive Adaptive Management Plan (LVWCAMP). The planning phase of the LVWCAMP is complete, and actions are in progress to restore the wash, its wetland, and the wash's ability to improve quality of return flows into Lake Mead.

Salinity. The Las Vegas Wash is a natural drainage channel that provides the only surface water outlet for the entire Las Vegas Valley (approximately 2,193 square miles). The wash conveys storm runoff and wastewater from Las Vegas Valley into Lake Mead. The wash has highly saline soils. Wastewater and runoff in the wash pick up salts that are then delivered into Lake Mead. To limit exposure to saline soils a bypass pipeline was built to separate wastewater discharge and industrial return flows from the wash. This bypass pipeline is estimated to have reduced salt loading into the Colorado River by 3,800 tons per year.

However, growth in the Las Vegas Valley has increased the amount of wastewater discharge, runoff, and industrial cooling waters that enter the wash. Salinity is thought to be increasing in the wash (DOI 1999) and this could lead to increased salinity below Hoover Dam, making it more difficult to meet the 723-mg/L numeric criterion immediately downstream.

Ammonia Nitrogen and Phosphorus. Wasteload allocations for ammonia nitrogen and phosphorus have been established by the NDEP. These wasteload allocations are per the TMDL Program of the Clean Water Act. Wasteload allocations are the mass limits of a contaminant allowed to be discharged by a particular treatment plant; together, all treatment plants combined must not exceed the TMDL. The objective is to limit the total mass of nutrients entering Lake Mead (LVWCC 1999). A total of 970 pounds per day of ammonia nitrogen and 434 pounds per day of phosphorus are allowed amongst dischargers with a portion of the wasteload allocation assigned to non-point sources (LVWCC 1999).

Perchlorate. Ammonium perchlorate has been detected in the water of the Colorado River and Lake Mead. Perchlorate concentrations have ranged from less than 4 ppb to 17 ppb at the SNWA's water intake at Lake Mead (US EPA 1999, SNWA unpublished data). The EPA identified two facilities that manufactured ammonium perchlorate in Henderson, Nevada, that were found to have released perchlorate to groundwater. Kerr-McGee Chemical Company and the NDEP have worked together to begin intercepting a major surface flow of perchlorate-laden water along Las Vegas Wash. This program is now ongoing and has significantly reduced the amount of perchlorate entering the Las Vegas Wash, Lake Mead, and the Colorado River. This remediation program will continue into the future and will continue to reduce perchlorate contamination in groundwater and in Colorado River water in Lake Mead and downstream (USBR 2000b).

Affected River Reaches

Hoover Dam to Parker Dam

Major features between Hoover Dam and Parker Dam include Davis Dam, Havasu National Wildlife Refuge (NWR) and Bill Williams River. Immediately downstream of Hoover Dam, river flows consist almost entirely of water released from Lake Mead. Minor gains in the river come from tributaries such as the Bill Williams River, groundwater discharge, and return flows from agriculture.

Daily and hourly releases from Hoover Dam reflect the short-term demands of Colorado River water users having diversions located downstream, storage management in Lakes Mohave and Havasu, and power production at Hoover, Davis, and Parker Dams. Reclamation combines the total estimated water releases of Davis Dam and the target Lake Mohave elevation to determine the monthly amount of water required downstream of Hoover Dam. This monthly release is formulated into a monthly energy figure for Hoover Dam. The monthly energy figure is used by Western Area Power Administration to meet the daily energy requirements of the electric service customers.

The close proximity of Lake Mohave to Hoover Dam effectively dampens the short-term fluctuations below Hoover Dam. Since 1980, annual release from Mead has varied from a low of 7.4 MAF to a high of 21.4 MAF (personal communication R. Carson, US Bureau of

Reclamation, 2001). Within a given month, daily releases can vary by more than 22,000 cfs. Since 1980, within any given non-flood year, flows through Hoover Dam have ranged from 750 cfs to 27,000 cfs. Hourly flows are managed to optimize hydroelectric production. The fluctuation within daily, monthly, and seasonal flows is generally less than that of hourly flows. In order to paint a picture of long-term lake level trends, as opposed to short-term fluctuations, annual flows have been chosen as the units of analysis.

The primary purpose of Davis Dam is to re-regulate Hoover Dam releases to meet downstream needs and aid the annual delivery of 1.5 MAF to Mexico. Releases at Davis Dam are scheduled on a daily basis to meet the water demands downstream and Lake Havasu storage management. The hourly release profile is determined by the electric service customer requirements, the current downstream river needs and upstream Lake Mohave requirements. Since 1980, annual release from Davis Dam has varied from a low of 7.3 MAF to a high of 21.7 MAF (personal communication R. Carson, U.S. Bureau of Reclamation, 2001).

Parker Dam's primary purpose is to provide reservoir storage from which water can be pumped into the CRA and the CAP aqueduct. The CRA delivers water to metropolitan Los Angeles and San Diego areas. The CAP delivers water to cities, industries, Indian communities, and agricultural areas in central and southern Arizona, including the Phoenix and Tucson areas. Parker Dam also has a powerplant function and may provide a minimal amount of flood control, capturing and delaying flash floods into the river from tributaries below Davis Dam. Parker also re-regulates water released from the Hoover and Davis powerplants, thus regulating river flow for downstream irrigators. Releases at Parker Dam are scheduled on a daily basis to meet the short-term demands of Colorado River water users located downstream. The hourly release profile is determined by the electric service customer requirements.

WATER QUALITY

Salinity. Average flow weighted salinity below Hoover Dam for the period 1990 to 1999 varied from 549 to 667 mg/L (USGS 2000). This is below the numeric criterion of 723 mg/L. Salinity is projected to increase to 790 mg/L by the year 2015 without additional controls (DOI 1999 and DOI 2001). However, it is assumed per the Colorado River Basin Salinity Forum that additional salinity control projects will be constructed to meet the adopted numeric criteria (see section 3.1.1).

Parker Dam to Imperial Dam

Major features between Parker and Imperial Dam include Headgate Rock Dam, Colorado River Indian Tribe Diversion, Palo Verde Diversion Dam, and Cibola and Imperial NWRs.

Flows between Parker and Palo Verde Diversion Dam result primarily from releases from Parker Dam. Since 1980, annual release from Parker Dam has ranged from a low of 5.5 MAF to a high of 20.5 MAF. These releases are adjusted daily to meet the water demands of downstream users unless flood control releases are being made. These releases fluctuate within the day to help meet power demand, but to a much lesser extent than the fluctuations seen at Hoover Dam. Within a given month, daily releases can vary by more than 11,000 cfs. Since 1980, within any given non-flood year, flows through Parker Dam have ranged from approximately 1,500 cfs (with a minimum of 30 cfs during an emergency situation) to approximately 19,500 cfs.

Palo Verde Diversion Dam is the intake for California's PVID. Flows between Palo Verde Diversion Dam and Imperial Dam are set by downstream demands and required deliveries to Mexico. Imperial Dam is the diversion point for the AAC, Yuma Main Canal, and the Gila Gravity Main Canal. The AAC delivers to California's YPRD, IID, and CVWD. The Yuma Main Canal delivers to Arizona's Yuma Project, while the Gila Gravity Main Canal delivers to Arizona's Gila and Wellton-Mohawk projects.

There are a few lakes off the mainstem of the Colorado River that are affected by flow and elevations of the river, including lakes associated with NWRs. Cibola Lake, which is part of the Cibola NWR, has inlet and outlet structures to maintain desired lake levels. Three Fingers Lake also has inlet and outlet control structures. Ferguson Lake, within Imperial NWR, does not have control structures, although the lake is separated from the river by a sandbar that blocks direct surface water connection to the Colorado River. Water levels at Ferguson Lake are maintained by groundwater inflow derived by percolation of Colorado River flows. Other lakes, such as Adobe and Martinez lakes have no control structures, and water levels are dependent on levels of the river or reservoirs on the river.

GROUNDWATER

The Colorado River is in hydraulic continuity with the groundwater in the underlying alluvium in this reach. Depending on river stage and groundwater elevations, the river can receive inflows from the aquifer, or can provide recharge to the aquifer. The hydraulic connection results in groundwater levels that, at least in part, reflect the stage in the Colorado River (personal communication, D. Watt, Reclamation, 2001).

WATER QUALITY

Salinity. Average flow weighted salinity below Parker Dam for the period 1990 to 1999 varied from 549 to 673 mg/L (DOI 2001). This is below the numeric criterion of 747 mg/L. Salinity is projected to increase to 810 mg/L by the year 2015 without additional controls (DOI 1999). Average flow weighted salinity at Imperial Dam for the period 1990 to 1999 varied from 655 to 803 mg/L, below the numeric criterion of 879 mg/L (DOI 2001). Salinity is projected to increase at Imperial Dam to 928 mg/L by the year 2015 without additional controls (DOI 1999). However, it is assumed per the Colorado River Basin Salinity Control Forum, that additional salinity control projects will be constructed to meet the adopted numeric criteria (see section 3.1.1) in all reaches.

Service Areas

Imperial Irrigation District

HYDROLOGY

The IID service area covers over 1 million acres in the Imperial Valley. Approximately 521,000 acres are used for farming operations, of which 461,000 acres are irrigated (IID 1999). Ninetyeight percent of the water managed by IID goes to agriculture, and 2 percent is treated for municipal use by nine cities in the Imperial Valley (IID 1999).

From 1990 to 1999, IID's annual diversions of Priority 3a and 6a Colorado River water averaged approximately 3,000 KAFY (USBR Decree Accounting). During these years, per the IID/MWD 1988 Agreement, 1989 Approval Agreement and 1989 Supplement to Approval Agreement, IID conserved between 6.1 KAFY to 108.5 KAFY (67.3 KAFY average) and an equivalent amount of water was made available to MWD (USBR Decree Accounting).

The majority of drainage from lands within the IID service area is collected and transported through a network of surface drains exceeding 1,400 miles that discharge system-wide into either the New or Alamo Rivers or directly into the Salton Sea.

GROUNDWATER

Groundwater levels in the IID service area are fairly shallow, and some free flowing springs and artesian wells are found in the eastern portion of the district. Imperial Valley groundwater has high salinity — in the 1,000 to 6,000-mg/L range — which severely limits its use as a water supply. There are few groundwater users in the Imperial Valley due to the poor water quality (USBR and SSA 2000).

WATER QUALITY

Surface water quality in the Imperial Valley is heavily dependent on the quality of imported supplies, and thus, on Colorado River quality at Imperial Dam. Imperial Valley drain water quality is dependent on source water quality, soil type, and agricultural practices. Water quality of the Alamo and New Rivers is heavily dependent on agricultural practices in the Imperial Valley and wastewater treatment practices in the Mexicali Valley. IID drains are considered to be "impaired" due to high sedimentation/silt levels and exceed the EPA Aquatic Life Criteria (Criterion Continuous Concentration) for selenium (data collected by IID). The Alamo River is considered to be impaired due to high sediment/silt levels, and the New River is considered to be impaired due to pathogens (IID and USBR 2002).

Under section 303(d) of the Clean Water Act, states, territories, and authorized Indian tribes are required to submit lists to the EPA detailing water bodies for which existing pollution controls are insufficient to attain or maintain water quality standards. After submitting the list of "impaired waters," states must develop a plan, called the TMDL plan, to limit excess pollution. Within the TMDL process, states assess water quality problems, contributors to these problems, and establish actions needed to achieve water quality objectives. The focus is on setting total maximum daily loads for specific pollutants throughout the watercourse. TMDL plan implementation can be accomplished through revised National Pollutant Discharge Elimination System (NPDES) permit requirements (for point source contaminants) and through implementation of Best Management Practices (BMPs) that include changes in agricultural practices (EPA 1999). The establishment of a TMDL conceptually consists of four phases, which are water body assessment, development of allocations, development of an implementation plan, and amendment of the basin plan (SWRCB 2001b). A TMDL start date is the date (usually stated as a year) when the responsible agency begins development of the TMDL Implementation Plan, while the completion date is the projected date that the TMDL

Implementation Plan is complete and ready for adoption into the Basin Plan. Within the study area, a TMDL of 200 mg/L has been proposed for silt in the Alamo River and a 200-membrane filter count per 100 milliliters (MPN/100 ml) for fecal coliform, 126 MPN/100 ml for *E. Coli*, and 33 MPN/100 ml for Enterocci have been proposed for bacteria in the New River. Impaired waters and TMDL program details for water bodies in the project area are provided in Table 3.1-1.

Table 3.1-1. Impaired Water Bodies Potentially Affected by the QSA in the IID Service Area

Water Body	*Pollutant of Concern*	*TMDL Completion Date*
Alamo River	Pesticides Selenium Silt	2011 2010 Proposed Basin Plan Amendment
Imperial Valley Drains	Pesticides Selenium Silt	2011 2010 2004
New River	Nutrients Pesticides Silt Dissolved Oxygen Trash Chloroform Toluene p-Cymene 1,2,4-trimethylbenzene m,p,-Xylene o-Xylenes p-DCB Bacteria/Pathogens	2010 2011 2002 2006 2007 2011 2011 2009 2009 2008 2008 2010 Proposed TMDL
Salton Sea	Nutrients Salt Selenium	2004 undefined 2010

Sources: State Water Resources Control Board (SWRCB) 1999 and 2001a, Arizona Department of Environmental Quality 2002, Colorado RWQCB 2001, NDEP 2000.

Water quality in the AAC is similar to water quality at Imperial Dam. Data shows that TDS concentration in water from the AAC changes little between the input at Imperial Dam and the outlet in the IID service area (EPA STORET database).

Coachella Valley Water District

HYDROLOGY

CVWD uses Colorado River water, groundwater, and recycled water to serve the approximate 640,000 acres within its boundaries. Approximately 60,000 acres are irrigated, and CVWD serves an urban population of approximately 192,000 Coachella Valley residents (CVWD 2000a). The total water demand in 1999 in the Coachella Valley was approximately 669 KAF, of which 310 KAF (46 percent) was for urban uses and 359 KAF (54 percent) was for agricultural uses.

From 1990 to 1999, annual average diversions of Priority 3a and 6a Colorado River water by CVWD were 330.9 KAF (USBR Decree Accounting). CVWD diversions of Colorado River water during the period 1964 to 1999, have ranged from a minimum of approximately 310 KAFY to a maximum of approximately 571 KAFY (USBR Decree Accounting).

CVWD operates and maintains a collector system of 166 miles of pipes and 21 miles of open ditches, to serve as a drainage network for irrigated lands within the valley. All agricultural drains empty into the CVSC except those at the southern end of the valley, which flow directly into the Salton Sea (CVWD 2000a). The CVSC itself also drains into the Salton Sea (CVWD 2000a). This system serves nearly 38,000 acres and receives water from more than 2,293 miles of on-farm drain lines (CVWD 2000a).

GROUNDWATER

The Coachella Valley groundwater basin extends from the northwestern edge of the Upper Valley (roughly defined as the area northwest of Washington Street) near the unincorporated community of Whitewater to the Salton Sea in the Lower Valley (roughly defined as the area southeast of Washington Street). The hydraulic gradient in the Coachella Valley is towards the Salton Sea. The Upper Valley aquifer is generally unconfined, although there is a lens of clay in the southern portion that results in both confined and unconfined conditions. The Lower Valley aquifer occurs in four main hydrogeologic units: the semi-perched aquifer, the upper aquifer, the aquitard and the lower aquifer. The semi-perched aquifer is unconfined, while the upper and lower aquifers are confined (unpublished data CVWD).

In 1999, groundwater supplies accounted for approximately 56 percent of the Coachella Valley's water supply (CVWD 2000a). Since the early part of this century, the Coachella Valley has been dependent on groundwater as a source of supply, and a significant decline in groundwater levels was apparent in the early 1980s. The condition of a groundwater basin in which the outflows (demands) exceed the inflows (supplies) to the groundwater basin is called "overdraft." In 1999, the annual overdraft in the Coachella Valley was estimated to be 136.7 KAF; total Coachella Valley overdraft was estimated to be approximately 5,100 KAF. CVWD issued a draft CVWMP in November 2000 to address groundwater overdraft and other water management issues. Environmental documentation for the CVWMP is currently being prepared, and a draft PEIR is expected in 2002.

WATER QUALITY

Water quality of CVWD's water supply is heavily dependent on the quality of imported supplies, and thus, on Colorado River quality at Imperial Dam and Coachella Valley groundwater quality. The water quality description for CVWD's Colorado River supplies is the same as IID's Colorado River water quality, which is described above.

As discussed earlier, water quality in the AAC is similar to water quality at Imperial Dam.

The Coachella Canal has had water quality problems. Some parameters, specifically, pH, Iron, TDS, Fluoride, and Thallium did not meet Federal and State drinking water standards at some point in the 1987 to 1999 period. However, the canal water is only used for agricultural purposes and is not a drinking water source.

Water quality in the upper Coachella Valley has TDS generally below the EPA's primary drinking quality standard of 500 mg/L, except in areas adjacent to the Whitewater Spreading Facility and near the community of Palm Desert. In the Lower Valley, there are several areas where TDS exceeds 500 mg/L. For example, the area between the communities of Indio, Coachella, La Quinta and Valerie, and the area between the communities of Oasis and Mecca exceed both the primary and secondary (1,000 mg/L) drinking water standard for TDS (unpublished data CVWD).

Preliminary studies by CVWD have identified the salt inputs and salt removal components within the Upper and Lower valleys. Table 3.1-2 illustrates the salt budget in the Coachella Valley in the Year 1999. As detailed in this table, local water sources are generally low in salinity and there is evidence that the majority of salinity in the Upper Coachella Valley groundwater comes from SWP recharge. In the Lower Valley, the major sources of salinity have been identified as canal water use and Salton Sea intrusion.

Table 3.1-2. Salt Budget in the Coachella Valley for Year 1999

Salt Balance Component	*Upper Valley*	*Lower Valley*	*Total*
Salt Addition (tons/year)			
Natural Recharge	8,000	1,000	9,000
SWP Recharge	70,000	0	70,000
Canal Water Use	1,000	251,000	252,000
Salton Sea Intrusion	0	71,000	71,000
Fish Farm/Duck Club Reuse	0	0	0
Input from Upper Valley	0	10,000	10,000
Domestic Use Increment	8,000	7,000	15,000
Fertilizers	4,000	16,000	20,000
Total Salt Addition (tons/year)	91,000	356,000	447,000
Salt Removal (tons/year)	0		
Drain Flows	0	156,000	156,000
Outputs to Salton Sea	0	2,000	2,000
Fish Farm/Duck Club Pumping	0	7,000	7,000
Municipal Wastewater Discharge	0	7,000	7,000
Output to Lower Valley	10,000	0	10,000
Total Salt Removed (tons/year)	10,000	172,000	182,000
Net Salt Added (tons/year)	81,000	184,000	265,000

Source: Unpublished data CVWD

Nitrates exceed the primary MCL of 45 mg/L in many areas of the Coachella Valley; the source of these nitrates is thought to be fertilizers, septic tanks, and water recycling. Sulfates in the Upper and Lower valleys are generally below the secondary drinking standard of 500 mg/L, but a few lower Valley wells have elevated sulfate concentrations. Salton Sea intrusion has been identified as the potential source of these sulfates (unpublished data CVWD). Only a few wells in the CVWD service area have arsenic concentrations above the MCL of 50 µg/L. However when the MCL for arsenic is lowered to 10 µg/L in year 2006 many wells throughout the Coachella Valley will exceed this MCL. Perchlorate has recently been detected at levels of 4 to 6 ppb in Colorado River water delivered to the Coachella Valley.

Water quality in surface drains in the Coachella Valley and in the CVSC is dependent on the source water quality, soil type, and agricultural practices. A TMDL is proposed for the Coachella Valley for bacteria/pathogens (SWRCB 2002).

Metropolitan Water District

HYDROLOGY

MWD is a public agency organized in 1928 under the authority of the Metropolitan Water District Act, with the primary purpose of developing, storing and distributing water to member public agencies within the Southern California coastal plain for domestic and municipal uses. MWD sells water to 26-member agencies that serve 5,200 square miles of Southern California and over 17 million people, including SDCWA. MWD obtains most of its water supply from the Colorado River and the California SWP.

From 1990 to 1999, MWD diverted on average, 1,191.2 KAFY of Colorado River water. This includes 550 KAFY of Priority 4 water in all 10 years, an average of 529.2 KAFY of Priority 5a and 5b water (including an average of 67.3 KAFY of Priority 3a water conserved by IID and made available to MWD), an average of 98.7 KAFY of unused Priority 3 water, and an average of 13.3 KAFY of surplus water under the MWD/Reclamation Surplus Flows Contract (USBR Decree Accounting). The water available under the 1988 IID/MWD Agreement and the 1989 agreements varied from a minimum of 6.1 KAFY to a maximum of 108.5 KAFY (USBR Decree Accounting).

WATER QUALITY

MWD's Colorado River water supplies are primarily dependent upon the water quality of the Colorado River at Lake Havasu/Parker Dam.

San Diego County Water Authority

HYDROLOGY

SDCWA is the largest water purchaser of the 26-member agencies of MWD. From fiscal year 1990 to 1999 SDCWA purchased, on average, 469.3 KAFY from MWD. SDCWA serves 2.8 million people in a service area of 1,420 square miles. Seventy-five to 95 percent of SDCWA water supply is imported from MWD. Local supplies make up the remainder of the supply to the SDCWA service area. SDCWA delivered 619.4 KAF to its service area during fiscal year 1999 (from July 1, 1998 to June 30, 1999), of which, 453.7 KAF was purchased from MWD (personal communication, Tim Bombardier).

Within the SDCWA distribution system are connections to deliver water to two of the San Luis Rey Indian Water Rights Settlement Parties, the City of Escondido and Vista Irrigation District. The collective group, La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, and the City of Escondido, and Vista Irrigation District, are named in Public Law 100-675 (1988) that provides for settlement of water right claims and authorizes lining of the AAC and Coachella Canal.

WATER QUALITY

SDCWA water quality is heavily dependent on the water quality of supplies delivered from MWD. SDCWA receives MWD water from both Lake Skinner and from a bypass north of the Lake.

Arizona

The portions of Arizona in the Lower Basin that depend on Colorado River mainstream water consist of the following areas:

- The Colorado River from Lake Mead to the SIB;
- The Gila River Valley upstream from Yuma, Arizona; and
- A large area in the central part of the State served by facilities of the CAP.

Under the BCPA and the Decree, Arizona receives an annual apportionment of 2.8 MAF from the Lower Division States' total of 7.5 MAF. Arizona also has a 50 KAFY annual entitlement from the Upper Basin apportionment that would not be affected by the proposed action or alternatives. Arizona's use of Colorado River water, including that used for groundwater banking, reached its normal year entitlement of 2.8 MAF in 1997. However, its direct consumptive use since then has been less than this amount. Arizona's normal year depletion schedule is projected to reach 2.8 MAF in 2006, and remain at that level thereafter (refer to Appendix G).

Arizona has numerous users of Colorado River water. The largest diversion of water is for the CAP that delivers water to contractors in the central part of the State. CAP's diversion is located at Lake Havasu. The next three largest diversions are those of the Colorado River Indian Reservation at Headgate Rock Dam and the Gila and Yuma Projects, whose diversions are located at Imperial Dam. The remaining diversions serve irrigated areas and community development along the river corridor, including lands of the Fort Mojave Indian Reservation, water used by Federal agencies in Arizona, the cities of Bullhead, Lake Havasu and Parker, Mojave Valley Irrigation District and Cibola Irrigation District. A portion of the water from the river corridor is also diverted by wells located along the river.

The CAP and other fourth priority Arizona users that contracted for Colorado River water after September 30, 1968, have the lowest priority. The exceptions are lower priority contractors that contracted for unused normal year entitlement and surplus year supplies when available. Included in the non-CAP category are Bullhead City, Lake Havasu City, Mojave Valley Irrigation District and others. Of the 2.8 MAF of Colorado River water apportioned to Arizona, a total quantity of not to exceed 164,652 AFY of annual diversions is available for satisfaction of water deliveries to fourth priority Arizona non-CAP water users under contracts or obligations entered into or established subsequent to September 30, 1968 (post-CAP contractors). Contracts or obligations entered into or established prior to September 30, 1968 (pre-CAP contractors) enjoy a priority that is senior to the CAP and the post-CAP contractors, and include Indian reservations, PPRs, wildlife refuges, and other pre-CAP contractors. The pre-CAP contractors have a combined annual diversion right of about 1.7 MAF.

Under shortage conditions, initial shortages in the U.S. are shared between Nevada and Arizona on a four and 96 percent basis, respectively. There are no specific shortage criteria established for Lake Mead. For modeling purposes, shortage criteria are assumed to adequately model the Colorado River system. See section 3.1.2 for detailed information regarding the modeling of shortage assumptions. A sensitivity analysis was also done, using a different shortage protection elevation for Lake Mead. This analysis can be found in Appendix G.

Within Arizona, any use of water occurring under contracts for unused entitlement is eliminated first (along with groundwater recharge) under shortage conditions. Any remaining reduction in Arizona would be shared pro rata between the CAP and the non-CAP holders of fourth priority entitlements. More severe shortages would result in holders of higher priority entitlements having to incur reduction in their water use.

Arizona's basic strategy for meeting short-term shortages in CAP municipal and industrial (M&I) supply centers on reduced uses for recharge, reduced agricultural deliveries and an increased use of groundwater. In addition to naturally occurring groundwater, Arizona has established a groundwater bank, which is managed by the AWBA. Arizona established the AWBA in 1996. The State legislation that authorized the AWBA states that it was created (1) to increase Arizona's use of Colorado River water by delivering through the CAP system and storing water that otherwise would be unused by Arizona; (2) to ensure an adequate water supply to CAP M&I users in times of shortages or disruptions of the CAP system; (3) to meet water management plan objectives of the Arizona State groundwater code; (4) to assist in settling Indian water rights claims; and (5) to provide an opportunity for authorized agencies in California and Nevada to store unused Colorado River water in Arizona for future use. Currently Arizona is actively storing CAP water that is excess to its current needs. Groundwater banking is occurring with the intent of providing a source for withdrawal during periods when the amount of Colorado River water available for diversion under the CAP priority is curtailed by shortage conditions. Additionally, CAWCD has stored a substantial amount of CAP water in central Arizona.

Nevada

The portion of Nevada that depends on Colorado River water is limited to southern Nevada, primarily the Las Vegas Valley and the Laughlin areas. The CRC and SNWA manage Nevada's Colorado River water supply. The SNWA coordinates the distribution and use of the water by its member agencies whose systems provide retail distribution.

Nevada has five principal points of diversion for Colorado River water. The largest of these is the Las Vegas Valley that pumps water from Lake Mead at Saddle Island (on the west shore of the lake's Boulder Basin) through facilities of SNWA. The water is pumped at two adjacent pumping plants. The pumped water is treated before being distributed to the Las Vegas Valley and to Boulder City water distribution systems. Three other diversion points are downstream of Davis Dam. They serve the community of Laughlin, Southern California Edison's coal fired Mohave Generating Station and uses on that portion of the Fort Mojave Indian Reservation lying in Nevada. The fifth diversion consists of water used by Federal agencies in Nevada, primarily the National Park Service and its concessionaires at various points on Lakes Mead and Mohave.

Nevada's current Colorado River water demand is slightly above its Colorado River normal water apportionment under the BCPA and the Decree of 300,000 AFY. SNWA depletions represent approximately 90 percent of this amount.

SNWA's Integrated Resource Plan calls for optimizing both the use of Colorado River water and the use of the Las Vegas Valley shallow aquifer before developing water from additional sources, including the lower Virgin River and Muddy River. The SNWA has been supporting groundwater recharge in the Las Vegas Valley through facilities of member agencies. The artificial recharge of Colorado River water into the Las Vegas Valley groundwater basin is intended to help meet summer peak demands, provide an interim future water supply and stabilize declining groundwater tables. Water agencies in the valley will be able to withdraw water to meet temporary shortfalls in supply. However, such withdrawals would be coupled with the opportunity for replenishment of the aquifer.

Salton Sea

The Salton Sea is a large saline lake, inundating the lowest elevations of the Imperial and Coachella Valleys. The current Sea was created when a temporary canal on the Colorado River failed in 1905, resulting in an uncontrolled diversion of the Colorado River into the Imperial and Coachella valleys for 18 months. The Salton Sea is a terminal lake without a surface water outlet. The water level in the Sea has varied since the 1905 flood, but has been relatively stable, near elevation –228 feet msl since the 1980's (USBR and SSA 2000). This consistent elevation indicates that annual inflow to the Sea has approximately equaled the annual rate of evaporation. However, more recent trends indicate that the sea elevation is in decline (personal communication, P. Weghorst, 2001).

Inflow to the Salton Sea varies from year to year depending on rainfall and drainage from local runoff and irrigation districts. Table 3.1-3 summarizes the relative contributions of source inflows to the Salton Sea. Agricultural flows reach the Salton Sea via the Alamo River, New River, agricultural drains, and Whitewater River. Groundwater and direct precipitation account for only a small percentage of the Sea's inflow. Further information regarding the surface hydrology associated with the Salton Sea is available in the IID Water Conservation and Transfer Project EIR/EIS.

Table 3.1-3. Sources of Salton Sea Inflow

Source of Inflow	*Total Average Annual Inflow (AF)*	*Percent Contribution of Total Inflow*
Alamo River	623,678	46.4
New River	441,475	32.9
IID Agricultural Drains (that directly drain to the Sea)	93,250	6.9
Surface Flows from CVWD (including Whitewater River)	115,053	8.6
Subsurface flows from CVWD	1,539	0.1
Unmeasured inflows[a]	68,400	5.1
Total	1,343,395	100 percent

[a] Unaccounted for direct runoff, unmeasured inflows from IID and CVWD as well as errors and/or omissions resulting from development of historic water balance.
Source: Personal communication. P. Weghorst, 2001

The water quality of the Salton Sea is a function of its source waters, agricultural and municipal wastewater. Because the Sea has no natural outlet, salt loads entering the water tend to accumulate. Given the Sea's evaporation rate of nearly 6 feet per year and minimal precipitation, the entire Sea would evaporate within about 10 years if all inflows were stopped. In the 1950's and 1960's salinity fluctuated between about 31,000 and 39,000 mg/L. From 1990-1999 the average salinity was 42,600 mg/L and in year 2000, the average salinity of the Sea (measured as TDS concentration) was approximately 44,000 mg/L (personal communication, P. Weghorst 2001).

The RWQCB, Colorado River Region has identified the Salton Sea and a number of its tributaries as impaired and subject to planned TMDL requirements for bacteria, nutrients, pesticides, selenium, silt, and volatile organic compounds. Colorado River water is reported to be the sole source of selenium to the Sea (USGS Water Resource Investigation Report 93-4014). Nutrient loading (ammonia, nitrate, phosphate) is a result of agricultural practices and wastewater management practices within the Salton Sea basin as well as industrial and municipal effluent from Mexico (USBR and SSA 2000).

3.1.2 Environmental Consequences

Impact Assessment Methodology

This section outlines the general impact assessment methodology, including the hydrologic modeling framework. Specific information on the modeling process for IA and IOP are provided in Appendices G and C, respectively. Modeling was not necessary for the biological conservation measures, as noted in section 3.0.

Different but interrelated modeling efforts and impact analyses were necessary to estimate changes due to the IA and IOP. The IA and IOP have differing impacts on the river. The IA program is in effect at all times, with a stepped decrease in diversions as transfers are implemented, but in every year representing a decrease in diversion from the existing condition.

The IOP represents a variable year-to-year change to the river, sometimes increasing flow and sometimes decreasing flow, which is not consistent from one year to the next. The degree to which inadvertent overruns would occur depends largely on unplanned actions by individual water districts, which in turn are affected by cropping patterns. In many years some water districts could use less than or equal to their normal apportionments. In other years districts may have inadvertent overruns. For this reason, the IOP has been modeled separately from the IA. Within the impact analysis, both the average and the "worst-case" IOP impacts are layered onto impacts of the IA. However, it should be stressed that impacts due to the IOP could vary from year to year, and that the worst-case change to river flows or reservoir elevations is the most extreme adverse change anticipated and is expected only once over the entire 75 years of analysis. Thus this methodology provides an overly conservative assessment of impacts due to the IOP and the combination of the IOP and IA.

Modeling of the IA

Baseline Colorado River System conditions (also known as the No-Action Alternative or "Future Without" project conditions) and the conditions resulting from the action alternatives were simulated using Reclamation's CRSS as currently implemented in the computerized modeling framework called Riverware. River operation parameters modeled and analyzed include the water entering the river system, storage in the system, reservoir releases from storage, and the water demands of, and deliveries to, the Basin States and Mexico. The model uses the 85-year natural flow record from 1906 through 1990 to estimate future inflows. Future Colorado water demands are based on demands and depletion projections supplied by the Basin States. The model simulates operation of Glen Canyon Dam, Hoover Dam, and other Colorado River system elements consistent with the LROC. CRSS was used to model the following four operational scenarios:

- No-Action Alternative (assuming ISG would be implemented, but no new water transfers would take place). This assumption was made to isolate the impacts of the IA for this EIS;
- IA (assuming the ISG would be implemented and the new water transfers proposed under the IA would take place);
- Baseline for Cumulative Analysis (the future assuming that neither the ISG nor water transfers per the IA would take place); and
- Cumulative Analysis (the future assuming that the ISG, IA water transfers, and the PVID Program would take place).

From these four scenarios two analyses were prepared:

- Evaluation of the potential impacts resulting from the implementation of the proposed IA water transfers. In this analysis the modeling results of No-Action and IA were compared, focusing upon potential changes in river operations and water deliveries; and
- Evaluation of the potential cumulative impacts resulting from the ISG, IA water transfers, and the PVID Program. In this analysis the modeling results of the Baseline for Cumulative Analysis and Cumulative Analysis were compared. This methodology and impact discussion is contained in section 4.2, Cumulative Impacts.

The modeling of the operational scenarios required certain assumptions with regard to various aspects of water delivery and system operations. Important assumptions common to all four operational scenarios include:

- Reservoir starting conditions were based on the projections of Reclamation's monthly operations model;
- Upper Basin States' depletion estimates were taken from the ISG Final Environmental Impact Statement (FEIS);
- Upper Basin reservoir operating rules (including Lake Powell) were those used in the ISG FEIS;
- Pursuant to the United States-Mexico Water Treaty of 1944, water deliveries to Mexico would be 1.5 MAF under normal conditions, up to 1.7 MAF under Lake Mead flood control release conditions, and less than 1.5 MAF under conditions of extreme shortage

when California's delivery is also cut below 4.4 MAF. The model assumes all United States-Mexico Water Treaty of 1944 deliveries are made at Morelos Dam.

- Lake Mead would operate to meet downstream demands and to follow the U.S. Army Corps of Engineers (USACE) flood control procedures;

- All Arizona shortages would be absorbed by the CAP;

- No specific shortage guidelines exist for the operations of Lake Mead. For modeling purposes, "First level shortages" would be declared when Lake Mead water elevations fall below a pre-determined "trigger elevation." The trigger elevation was set to protect Mead's minimum effective power generation elevation of 1,083 feet msl with an 80 percent probability. Under a first level shortage, CAP delivery would be reduced to 1,000 KAF and the SNWA would be reduced by 4 percent of the total shortage. "Second level shortages" would be declared when Lake Mead water surface elevations are forecasted (at the beginning of the year) to fall below a level where neither of SNWA's water intakes are operable (1,000 feet msl). Second level shortages would be absorbed by CAP and SNWA until CAP deliveries go to zero, at which time MWD and Mexico would equally share any additional shortages necessary to keep Lake Mead above 1,000 feet msl. Since no shortage guidelines exist, model simulations were also made protecting Lake Mead's elevation of 1,050 feet with second level shortages at 950 feet (see Appendix G for this sensitivity analysis);

- The Yuma Desalting Plant was assumed to remain in ready reserve status with 120 KAFY bypassed to the Cienega de Santa Clara in Mexico from 2002-2004. The desalting plant is assumed to operate beginning in 2005, reducing the bypass to 52 KAFY. For modeling purposes, this bypass is not counted as part of the Treaty delivery. The U.S. recognizes that it has an obligation to replace, as appropriate, the bypass flows and that the assumptions made herein, for modeling purposes, do not necessarily represent the policy that Reclamation will adopt for replacement of bypass flows. The assumptions made with respect to modeling the bypass flows are intended only to provide a thorough and comprehensive accounting of Lower Basin water supply. The U.S. is exploring options for replacement of the bypass flows, including options that would not require operation of the Yuma Desalting Plant. This summer, Reclamation will be sending out for public review a draft report that will propose criteria regarding the timing and rate of buildup of implementing bypass replacement measures. The criteria will be related to Colorado River storage levels. While this criteria has yet to be proposed, the modeling assumption used in this IA, of when to initiate operation of the Yuma Desalting Plant, was changed from 2023 to 2005 to approximate the expectation that some action would likely be initiated earlier than 2023 to address the bypass. This modeling assumption does not imply that Reclamation will propose to operate the Yuma Desalting Plant, or that the proposed criteria will have the effect of implementing full replacement measures starting in 2005. The 2005 assumption was simply thought to be a better approximation of the bypass being addressed in the near future;

- For the CVWD/IID/MWD Water Transfer Agreement (First and Second 50 KAFY) it was assumed that the 100 KAFY would be delivered to MWD rather than CVWD. This insured that the modeling considered the most extreme anticipated change to the Colorado River due to a change in point of diversion; and

- For the CVWD/MWD SWP Transfer and Exchange Agreement it was assumed that the 35 KAF involved in the transfer would be diverted at the CRA near Parker Dam for delivery to CVWD, rather than be diverted at the AAC near Imperial Dam. Again, this assumption was chosen to ensure that the analysis considered the most extreme anticipated change to the Colorado River due to a possible change in point of diversion.

The modeling of the operational scenarios required certain assumptions to differ, primarily the assumptions of water transfers and ISG. The following assumptions were used for specific operational scenarios.

- For the No-Action Alternative, no new water transfers were assumed (i.e., only the 1988/1989 IID to MWD transfer was assumed). Appendix G details each entity's assumed normal schedule. The ISG were assumed to be effective for the years 2002 through 2016 and ISG ROD benchmark reductions were assumed to be met by MWD.

- For the proposed action, new water transfers under the IA were assumed. These transfers would total approximately 388 KAF by 2026, dropping to 338 KAF in 2047. Appendix G details each entity's assumed normal schedule. The ISG was assumed to be effective for the years 2002 through 2016.

- For the Cumulative Baseline scenario, entity's normal schedules were the same as the No-Action condition. ISG was not assumed, but rather the 70R Strategy[1] as specified in the ISG FEIS was assumed for the years 2002 through 2076.

- For the Cumulative Analysis scenario, entity's normal schedules were those assumed under the IA scenario, with the addition of the PVID Program. These schedules are detailed in Appendix G. The ISG were assumed effective for the years 2002 through 2016.

To quantify the uncertainty with respect to future inflows, each operational scenario was analyzed for a range of possible inflows. Each future inflow scenario was generated from the historic natural flow recorded by cycling through that record. For example, the first simulation assumed that the inflows for 2002 through 2076 would be the inflows for 1906 through 1980, the second simulation assumed that inflows for 2002 through 2076 would be the inflows for years 1907 through 1981, and so on. As the method progressed, the historic record was assumed to "wrap around" (i.e., after 1990 the record reverted back to 1906). In all there were 85 separate inflow scenarios, related to the 85 years (1906 – 1990) of the historic record.

1. The 70R Strategy defined one of the factors considered by Reclamation prior to adoption of the ISG. The 70R Strategy process assumed a 70-percentile inflow into Lake Powell and after deducting consumptive uses and system losses and checks the results to see if all of the water could be stored or if flood control releases from Lake Mead would be required. If flood control releases from Lake Mead would be required, surplus water would be made available to Arizona, California, and Nevada beyond its normal year apportionment of 7.5 MAF.

The model contained 300 "nodes" (locations) related to geographic areas on the river system. The model generated monthly data for these 300 nodes given the 85 different inflow scenarios for the years 2002 through 2076. This huge amount of data was then aggregated to facilitate comparing the various alternatives and No-Action. Two basic categories of aggregation are common, those that aggregate in time, space, or both, and those that aggregate the 85 possible outcomes related to the 85 inflow scenarios. Three aggregated periods are routinely used in the analysis: the 15 year period that coincides with the ISG (2002 - 2016); the period following the ISG (2017 – 2076); and the entire 75 year period of analysis. The primary spatial aggregations relate to four river system components: Lake Powell; the River between Glen Canyon Dam and Lake Mead; Lake Mead; and the River below Hoover Dam. Once the appropriate temporal and spatial aggregation was chosen, standard statistical techniques were used to analyze the 85 possible outcomes. Statistical measures include mean, median, percentile, and standard deviation. Specific details on IA modeling are provided in Appendix G.

Estimating Changes to River Stage and Groundwater Elevations Due to the IA

Very detailed river stage and groundwater elevation modeling was performed for specific reaches under various flow regimes for the BA for the Proposed ISG (see Appendix D). Specifically, river stage at seven points between Parker Dam and Imperial Dam were examined:

- River Mile 192.2, Parker Dam;
- River Mile 177.7, Headgate Rock Diversion Dam;
- River Mile 152.0, Waterwheel gage;
- River Mile 133.8, Palo Verde Diversion Dam;
- River Mile 106.6, Taylor Ferry Gage;
- River Mile 87.3, Cibola Gage; and
- River Mile 49.2, Imperial Dam.

Assuming reductions in flow in the Parker to Imperial River reach from 200 KAFY to 1,574 KAFY (in increments of 100 KAF) River flow was calculated at these seven points. From these River flows, the River elevations were computed using the step-back water surface computations of the USACE HEC-RAS computer program using cross-sectional survey data for 20 representative type-areas distributed throughout the impacted reach. In addition, water surface elevations were used to calculate the impact on groundwater levels in areas adjacent to, but not directly connected to the River. Reduction in surface area of backwater and open river also was based on cross sectional data and backwater areas delineated in GIS. Because the range of flows analyzed under the BA (400 KAFY) captures the changes potentially occurring under the proposed action (reduction up to 388 KAFY), where applicable the BA analysis is included as part of this section.

Modeling of the IOP

In addition to assessing impacts due to water transfers under the IA, this EIS also assesses impacts resulting from implementation of the IOP. Potential changes to River flows, reservoir storage and flood flows were estimated using a spreadsheet analysis. Historical water use identified possible users of the IOP and the potential size of overruns based on historic overruns; differences in forecasted and actual use; and the ability of lower priority users to accurately estimate remaining apportionment. The potential for the CAP to have overruns was deemed minimal and the CAP was not included in the spreadsheet analysis, nor were the potential impacts of overrun and payback for Nevada modeled. This is due in large part because Nevada's apportionment is relatively small and because its diversion and return flows (and thus IOP effects) are contained within Lake Mead. Only overrun and payback actions by California entities PVID/YPRD, IID, CVWD, and MWD, were considered to have the potential to impact River flows, flood flows, and reservoir storage.

Using historic fluctuations in depletions, baselines were developed for years 2002 through 2076. Overruns were then estimated based on fluctuation from the baseline. PVID and YPRD have historically used an average of about 420 KAF, though this varies. PVID/YPRD are heavily agricultural and demand is tied to rainfall and cropping patterns. Although neither PVID nor YPRD have quantified water entitlements, overruns were considered to occur whenever combined PVID and YPRD use exceeded 420 KAF. Per the terms of the QSA, MWD would take responsibility for repaying PVID/YPRD "overruns." MWD would benefit by receiving water when PVID/YPRD use is less than 420 KAF. Priority 1 through 3 users are allowed a total apportionment not to exceed 3.85 MAF; within this, IID and CVWD are limited to 3.38 MAF[2] and any depletions over this amount are considered overruns.

The IOP modeling also analyzed different scenarios based on length of payback periods (1 or 3-year) and the maximum allowable overrun (e.g., 5 percent or 10 percent of entitlement). For each modeled scenario, the estimated future overrun account balances and paybacks were then ranked and analyzed statistically. Key statistics identified for each modeled scenario included the mean and maximum values and cumulative distribution. These statistics were then used to analyze effects on river flow, reservoir elevation, and other resources.

Specific details on IOP modeling are provided in Appendix C.

Modeling of Salinity Levels

In addition to modeling future reservoir levels and volumetric river flows, the CRSS model simulates the impacts of scheduled water development projects on future salinity levels. This model has been used extensively to estimate the amount of new salinity control projects required to reduce the river's salinity to meet the numeric criteria at some point in the future for the Colorado River Basin Salinity Control Program (SCP). The model itself does not include future salinity controls because implementation of future salinity control projects is dependent upon future Federal appropriations. By definition, the SCP is designed to be flexible enough to

2. The 3.38 designation for IID and CVWD inadvertent overrun is derived as follows: 3.85 MAFY allocated to Priorities 1 through 3, less 0.420 MAFY assumed to be used by Priorities 1&2 (PVID/YPRD), less the 0.11 MAFY transfer between MWD, plus 0.05 MAFY of water received by CVWD as part of the IID/MWD transfer (First 50 KAFY).

adjust for any changes caused by the various alternatives being considered. Therefore, it could be concluded that there would be no change in compliance with the standards caused by selecting any one of the alternatives. However, for the purposes of this analysis, each operational scenario has been evaluated to identify the differences between the No-Action and proposed action. Specific details on salinity modeling are provided in Appendix G.

General impacts of salinity were determined from review of records of historic river flow and salinity data available and economic impacts presented in *Quality of Water Colorado River Basin – Progress Report No. 19*, 1999, U.S. Department of the Interior; *Water Quality Standards for Salinity Colorado River System, 1999 Review*, June 1999, Colorado River Basin Salinity Control Forum and *Salinity Management Study*, Technical Appendices, June 1999, Bookman-Edmonston Engineering, Inc.

No-Action Alternative

No-Action for Implementation Agreement

In the hydrologic modeling the No-Action Alternative and baseline condition are the same. The No-Action Alternative represents expected future conditions in the absence of the proposed Federal actions.

Under No-Action, the following were assumed to occur:

- California would reduce its use of Colorado River water to meet targets defined in the ISG ROD. For modeling purposes, it was assumed that MWD would have primary responsibility for meeting the ISG ROD conservation targets.
- The 1988 MWD/IID Transfer Agreement (110 KAF from IID to MWD) would continue;
- The ISG would be in effect through 2016;
- Implementation of new, cooperative voluntary management plans or programs for water conservation, exchanges, or transfers as specified by the QSA would not occur. Additional funding to support further agricultural conservation would be subject to dispute; and
- Structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, would lose $200 million in State funding. Water transfers dependent on canal lining projects would not occur.

Currently California is able to divert other States' unused apportionments as the Secretary allows. Historically the unused portion of Arizona and Nevada entitlements have been used by California's Priority 5 (allocated to MWD) and Priority 6 (allocated to PVID, IID, and CVWD). As Arizona and Nevada begin to utilize their full entitlements, availability of water for Priorities 5 and 6 would be uncertain. Further, if the IOP were not adopted, the Secretary would enforce obligations under the Decree to ensure that no water contractor exceeds their contracted amount. Without the water transfers authorized by the IA and QSA, the biological conservation measures identified in the January 2001 BO would be unnecessary.

RESERVOIRS AND IMPACTED RIVER REACHES

In a broad sense, hydrology would not change dramatically as California decreases its use and Arizona and Nevada increase their use. In normal years, lower basin depletions would remain 7.5 MAFY though diversion points and amounts diverted at those points would change. Tables 3.1-4 and 3.1-5 illustrate the projected flows and trends in reservoir elevations for the No-Action condition.

WATER QUALITY

Under No-Action, assuming no additional salinity control projects were undertaken, salinity concentrations below Hoover, Parker, and Imperial Dams are projected to exceed numeric criteria established by the Salinity Control Forum by the year 2006 (DOI 1999). However, it is assumed that salinity control projects would continue to be implemented and numeric criteria for salinity would be met in all reaches.

SERVICE AREAS

California. Under No-Action conditions, for the period 2002 to 2076 the probability that California would have normal or above normal Colorado River supplies is about 99 percent. The probability of surplus Colorado supplies being available would be about 32 percent for this period, with that probability being higher in the early years. The anticipated maximum surplus depletion is anticipated to be 5.468 MAFY. The probability of shortage conditions would be about 1 percent, and minimum depletions are anticipated to be approximately 3.847 MAFY over this period.

Arizona. Under No-Action, for the period 2002 to 2076 the probability that Arizona would have normal or above normal Colorado River supplies is about 44 percent, with that probability being higher in the early years. The probability of surplus Colorado supplies being available would be about 19 percent for this period. The anticipated maximum surplus depletion is anticipated to be 3.24 MAFY. The probability of shortage conditions would be about 56 percent[3], and minimum depletions are anticipated to be approximately 1.405 MAFY over this period.

It is projected that CAP water would be used for groundwater recharge until about 2040 under normal and surplus conditions. This use will be terminated first in case of shortage. For other interim and long-term contract users, agriculture has the lowest priority. Therefore, irrigation users will be reduced before CAP M&I or Indian users in case of shortage conditions. Most irrigation users have rights to pump groundwater as a replacement supply. The increased use

3. The probability of first level shortages is approximately 47 percent for the years 2002 through 2076. In this same time period the probability of second level shortages is less than 9 percent.

1

Table 3.1-4. Projected Trends in Reservoir Levels Under the No-Action Condition

Lake Powell	
	Under No-Action, Lake Powell levels are expected to be lower than historic levels due to increased Upper Basin depletions. Median Lake Powell levels are expected to decline for a number of years and then stabilize under the No-Action Alternative. Elevations in Lake Powell may fluctuate between 3,700 msl and 3,537 feet msl.
Lake Mead	
	Under the No-Action Alternative reservoir levels are expected to vary over time, but generally decline. There is a 12 to 26 percent probability that Lake Mead levels would be 1200 feet msl or higher throughout the period 2002 to 2076. Modeled median water levels decline to approximately 1108 feet msl by the year 2040 under the No-Action Alternative and fluctuate between 1,106 feet msl and 1,116 feet msl through the year 2076.
Elevation to Efficiently Produce Electricity	Under No-Action, over the period 2002 to 2010, there is a 100 percent probability that Lake Mead levels would be greater than needed to produce electricity (1,083 feet msl). Over the period 2011 to 2030, that probability declines to about 73 percent and remains there through year 2040. After 2040, the probability again declines and in year 2053 is about 56 percent, remaining there through year 2076.
Elevation to Support SNWA's 1,050 intake	Under No-Action, Lake Mead levels are expected to exceed 1,050 feet msl, with a nearly 100 percent probability over the period 2002-2017. Beginning in 2018, the probability declines and by year 2030 is about 76 percent, remaining there through year 2050. After 2050, the probability further declines to about 61 percent by 2057 and remains there through 2076.
Elevation to Support SNWA's 1,000 intake	Under No-Action, Lake Mead levels are expected to exceed 1000 feet msl, with a 100 percent probability over the period 2002-2049. After 2049, that probability declines and by year 2058 is about 94 percent, remaining there through year 2076.
For more information refer to Appendix G.	

2

Table 3.1-5. Projected Flows of the Lower Colorado River Under the No-Action Condition

(*All numbers rounded and in MAFY*)

River Reach	*Maximum Projected Annual Flow*	*Projected Average Annual Flow*	*Minimum Projected Annual Flow*
Hoover Dam to Parker Dam			
At Havasu NWR	12.61	8.54 to 9.73	8.13
Parker Dam to Imperial Dam			
At Headgate Rock Dam	9.58	6.73 to 6.80	6.48
Below Palo Verde Diversion Dam	8.96	6.02 to 6.17	6.02
For more information refer to Appendix G.			

of the groundwater supplies and the management of the groundwater basins are expected to be consistent with the State's groundwater management goals.

Nevada. Under No-Action, for the period 2002 to 2076, the probability that Nevada would have normal or above normal Colorado River supplies is 48 percent. The probability of surplus Colorado supplies would be 31 percent. When surplus would be available, Nevada's water depletions would rise steadily from a current value of approximately 338 KAFY to approximately 514 KAFY in approximately 50 years and remain at that level thereafter. The probability of shortage conditions would be about 52 percent. Should a first level shortage be declared Nevada's depletions would be approximately 236.3 KAFY.

SALTON SEA

According to modeling carried out by Reclamation for the IID Water Conservation and Transfer Project EIR/EIS, the Salton Sea is expected to decline from its current elevation of about –227 feet to about elevation –235 feet over the 75-year study period (2002 – 2076) under the No-Action condition (i.e., no water transfers). During the same period, salinity would continue to increase from its current 44,000 mg/L to about 86,000 mg/L. At salinity levels of approximately 60,000 mg/L fish are not expected to survive, and this could occur in approximately year 2023 (personal communication, P. Weghorst, 2001). Detailed analysis can be found in the IID Water Conservation and Transfer Project EIR/EIS.

No-Action for Inadvertent Overrun and Payback Policy

The Secretary would apply existing law and not deliver water in excess of a State's, water district's, and other entity's entitlement.

No-Action for Biological Conservation Measures

Under this alternative, the biological conservation measures would not be implemented.

Proposed Action

The following sections describe the projected impacts from the proposed action relative to the No-Action scenario for different features of the Colorado River system and user service areas. This section focuses upon impacts from the water transfers under the IA and implementation of the IOP.

Specific actions taken under the proposed action are described in Chapter 2. In normal water supply years, California would be limited to 4.4 MAF (assuming no unused apportionment is available). For this EIS, it was assumed that under No-Action California would meet the ISG ROD benchmarks. Under No-Action, water apportionment in California would follow the Law of the River. Under the proposed action, California water would be apportioned per the Law of the River and allocated to the various users as modified by the QSA and IA. In surplus years, under No-Action, California would divert amounts similar to the recent past (average of 4.9 MAF). With the proposed action, conservation actions in IID would be used in both normal and surplus years to meet demands of California agencies. These conservation actions would continue in some surplus years, thereby reducing overall demand.

The potential impacts to hydrology, water quality, and water supply resulting from the biological conservation measures are uncertain. Creation of 44 acres of backwater, Tier 1 conservation measures including soil moisture maintenance, as well as Tier 2 conservation measures including restoration, revegetation, and maintenance of habitat are all planned within the Parker to Imperial reach of the Colorado River. These actions could result in the removal of some water from the mainstem of the Colorado River, as well as some dredging and construction activities. All biological conservation measures would be subject to Federal site-specific review. Potential impacts could include an increase in consumptive use of river water in the Parker to Imperial reach, as well as possible water quality impacts during construction.

Implementation Agreement and Adoption of Inadvertent Overrun and Payback Policy

GENERAL COLORADO RIVER

Hydrology. The focus of this analysis is the reach between Hoover Dam and Imperial Dam where transfers proposed under the IA and QSA could have impacts. Transfers under the IA would shift diversion of between 183 KAF and 388 KAF from Imperial Dam to Parker Dam, decreasing flow in this reach. This could result in lowering of median annual water levels by up to 0.4 feet in this reach (USBR 2000a).

The IOP adds a second "layer" of actions that could potentially change river flows. Inadvertent overruns would result in an increase in flows, because water is being released from Lake Mead to fill these inadvertent overrun water orders. Conversely, during a payback water orders would be lower and less water would be released from Lake Mead. As indicated in Chapter 2, the IOP does not constitute a change in an entity's entitlement, but rather the IOP allows an entity to temporarily vary from its permissible depletion, in some years having a minor overrun, with full payback occurring in no more than 3 years following the issuance of the decree record. Overall, because water taken per inadvertent overrun would be paid back (except following a flood control release), over time there would generally be no net increase or decrease in river flows.

An essential element of the IOP policy is payback. The different payback scenarios allow Reclamation to balance the needs of keeping certain elevations in Lake Mead while maintaining downstream flows. When an entity is in overrun, flows downstream from Hoover Dam would be increased and the volume in Lake Mead would be reduced. When an entity entered payback, the entity would decrease the water it requested released from Lake Mead, thus increasing the volume of Lake Mead, while decreasing flows in the Colorado River. The one-year payback scenario requires that an overrun be paid back in one-year. For example, if an entity overran by 10 KAF, that entity would have to payback the 10 KAF all in one year, releases from Lake Mead would be reduced by 10 KAF and flows to the Lower Colorado River would be reduced by 10 KAF over the year. With a three-year payback scenario the entity would still be required to payback the 10 KAF, but payback would occur over three years. Rather than reducing flows by 10 KAF all in one year, flows in the Colorado River would be reduced by 10 KAF spread over three years. The three-year payback scenario would have less impact to river flows. In both the one- and three- year scenarios payback equals overrun, but the degree of impact resulting to river flows is less under the three-year scenario.

As a specific example, if PVID/YPRD users took water in excess of 420 KAF, additional water would be released from Lake Mead and flows would be increased from Hoover Dam to the PVID diversion below Parker Dam and the Gila Gravity Main Canal at Imperial Dam. If IID/CVWD had an overrun, flows would again increase from Hoover Dam downstream to the AAC diversion at Imperial Dam. When MWD took action to pay back use in excess of 420 KAF by PVID/YPRD users, flows would be reduced from Hoover Dam to Parker Dam. When IID/CVWD enter into payback, flows would be reduced from Hoover Dam to Imperial Dam.

The most extreme impacts due to the IOP would be seen if all entities, within the same year, either: inadvertently incurred their maximum allowed overrun; or entered 1-year payback after accruing their full overrun account. In actuality, the likelihood of all entities being in maximum payback or maximum overrun in the same year is unlikely. A more reasonable estimate is to look at average payback and average overrun amounts.

Changes in system storage (i.e., storage in Lakes Powell and Mead) due to the IA are expected to be minor. The IA allows transfers of water between California entities within the State's total apportionment of 4.4 MAF. Therefore under normal conditions, these transfers would have no impact on Lake Mead's storage. However, under surplus conditions, the total delivery to California would be somewhat less under the IA compared to baseline conditions, the result of reduced agricultural use due to transfers and the ISG, which do not provide surplus water to the agricultural entities at the "Full" and "Partial Domestic" surplus levels. The impact of the reduced California deliveries under these surplus levels would be a slight increase in Lake Mead's contents, and under equalization conditions, a corresponding minor increase in Lake Powell.

Conversely, the IOP would result in some reduction in system storage due to overrun account balances. In any given year, system storage would be reduced compared to No-Action conditions, by the total of the account balances. Modeling of the IOP showed that the long-term average overrun account balance would be 66 KAF, and in the extreme case analyzed overrun account balances could total up to 331 KAF (see Appendix C). These reductions in storage would occur primarily at Lake Mead; however, under equalization conditions, the reduction would essentially be split between Lakes Powell and Mead.

Groundwater. Groundwater level impacts were evaluated by considering changes in river stage. The BA prepared by Reclamation (2000a, Appendix D) shows that changing the point of diversion from Imperial Dam to Parker Dam of 400 KAFY could lower the stage associated with the average annual flow by approximately 0.4 feet at some locations. The decline in river stage could result in similar declines in groundwater levels, again by as much as 0.4 feet. Reduction in groundwater elevation would be greatest in non-irrigated areas and less in irrigated areas.

Water Quality. Under the IA, projected salinity would be similar to that of No-Action. Below Hoover Dam and Parker Dam, projected salinity under the IA is no more than 1 mg/L higher than would be expected under No-Action. At Imperial Dam, salinity would be no more than 8 mg/L higher than would occur under No-Action. Table 3.1-6 compares the estimated Colorado River Salinity for No-Action and IA, for the years 2016, 2050, and 2076.

Increases in salinity from the IA, relative to the No-Action Alternative would be within the current fluctuation observed from month to month. However, it is assumed that additional salinity control measures would be implemented and standards would be met; the greater, albeit minor, salinity levels anticipated under the IA could require that salinity control measures be implemented on a different schedule than would be necessary under No-Action.

Table 3.1-6. Change in Colorado River Salinity in 2016, 2050, and 2076 IA versus No-Action [a]
Total Dissolved Solids (mg/L)

River Reach	*Year 2016*	*Year 2050*	*Year 2076*
Below Hoover Dam	+1	0	0
Below Parker Dam	+1	+1	+1
At Imperial Dam	+7	+8	+8

[a] No-Action conditions assume that further salinity controls would be implemented to ensure compliance with the numeric criteria established by the Salinity Control Forum.

RESERVOIRS

Lake Powell. The IA could cause minor increases to Lake Powell elevations. Under the IA, California would reduce its use of surplus Colorado River water compared to the No-Action, leaving slightly more water in Lake Mead. With more water in Lake Mead, less water would leave Lake Powell under equalization operations and there could be minor increases in elevation.

The trends seen under No-Action conditions would also occur under the IA. As can be seen in Figure 3.1-2, summertime Lake Powell water elevations would be almost identical for the No-Action and IA, with an occasional slight increase (less than 2.5 feet) under the IA. Under the IA the probability that Lake Powell would be at full reservoir (above elevation 3695) would be approximately 1 percent greater than under No-Action for the period 2002-2076. Further, with the IA, there would be an approximately 1 percent greater probability that Lake Powell would exceed elevation 3612 feet msl (the threshold for marina and boat ramps) relative to No-Action. On average, IOP overrun accounts totaling 66 KAF could be "owed" to the Colorado River system. While overrun and payback primarily influence Lake Mead water elevations, given the equalization rule between these two reservoirs, Lake Powell could also potentially be impacted. In the most extreme scenario, IOP overrun accounts totaling 331 KAF could be "owed" to the Colorado River system. As much as half (33 KAF) of the overrun accounts could be delivered from Lake Powell to Lake Mead through equalization. This could translate into an elevation change from 3 to 9 inches, depending on the reservoirs' starting condition. In the most extreme scenario as much as half (165 KAF) of the overrun accounts could be delivered from Lake Powell to Lake Mead through equalization. This could translate into an elevation change as great as 2.5 feet. It should be stressed that this is the most extreme scenario anticipated, and would occur only infrequently, if at all. Table 3.1-7 shows the potential change in Lake Powell elevation given specific starting elevations. The starting elevations displayed in Table 3.1-7 relate to a nearly full reservoir, the current (year 2000) annual elevation, elevation for boat ramp operation, and the lowest elevation anticipated under the IA. Since first reaching equalization storage with Lake Mead in 1974, the reservoir water level has fluctuated from a high of 3,708 feet msl to a low of approximately 3,612 feet msl, a variation of 96 feet. The potential elevation change from combined IOP and IA effects is anticipated to be within the historic fluctuation and the fluctuation that would be seen under No-Action.

Figure 3.1-2 Modeled Annual Lake Powell Summertime Elevations, Comparison of the No-Action and IA Alternatives

Table 3.1-7. Potential Change in Lake Powell Elevation for Specific Starting Elevation (Change in Storage Due to the IOP Relative to the No-Action Alternative)

Starting Elevation	*Decrease in Storage*	*Resulting Elevation*	*Change in Elevation*
3,680′ msl (nearly full)	165 KAF 33 KAF	3,678.9′ msl 3,679.75′ msl	1.1 ft 0.75 ft
3,662′ msl (current elevation)	165 KAF 33 KAF	3,660.65′ msl 3,661.5′ msl	1.35 ft 0.25 ft
3,612 ′ msl (operation of boat ramps)	165 KAF 33 KAF	3,610.38 ′ msl 3,611.7′ msl	1.62 ft 0.3 ft
3,537′ msl (lowest anticipated under IA)	165 KAF 33 KAF	3,534.5′ msl 3,536.5′ msl	2.5 ft 0.5 ft

Lake Mead. Like Lake Powell, under the No-Action Alternative, Lake Mead water surface elevations would decline over time. Figure 3.1-3 compares the relative differences in general lake level trends anticipated under No-Action and IA. Figure 3.1-3 also illustrates that lake levels would be similar or slightly higher (less than 5 feet) under IA than the No-Action condition. This again would be due to the fact that, under the IA, California would reduce its use of surplus Colorado River water compared to the No-Action Alternative, leaving more water in Lake Mead.

In terms of elevation to support power generation, the effects of the IA would be nearly indistinguishable from the No-Action Alternative (refer to Figure 3.1-4). Like No-Action, in the short term (years 2002-2010) under the IA, there would be a 100 percent probability that Lake Mead levels would be greater than needed to produce electricity. However, after year 2010, under both the IA and No-Action, there would be a 44 percent probability that Lake Mead would fall below 1,083 feet msl.

As illustrated in Figure 3.1-4, in the short term, through 2017, modeling results show that there would be a 100 percent probability that Lake Mead's level would exceed that needed for operation of SNWA's original intake (1,050 feet msl), under both the IA and No-Action Alternative. After 2017, under both the No-Action and IA, reservoir levels are projected to decline and there would be a 38 percent probability that the Lake's elevation would be lower than 1,050 feet msl.

Figure 3.1-4 also illustrates that the IA and No-Action Alternative would not differ with regard to operation of SNWA's second intake. Under both No-Action and IA, during years 2002 through 2049, modeling shows that there would be a 100 percent probability that Lake Mead would be greater than necessary to operate SNWA's second water intake (1,000 feet msl). After year 2049, Lake Mead elevation is projected to decline and there is a 6 percent probability that the Lake would fall below 1,000 feet msl.

Overrun accounts would be "borrowed" and would be paid back in later years or be "replaced" by floodwater, but until they were fully paid back they would represent a decrease in water storage. It is estimated that the long-term average overrun account "borrowed" would be 66 KAF (about 0.24 percent of active Lake Mead storage). Assuming that there was no

Figure

3.1-3 Modeled Annual Water Levels of Lake Mead, Comparison of the No-Action and IA Alternatives

Figure

3.1-4 Comparison of the No-Action and IA Alternatives for Key Lake Mead Elevations equalization with Lake Powell[4], a 66 KAF change in Mead storage would translate to a 0 to 2 foot change in reservoir elevation (depending on the Lake's initial elevation). In the most extreme scenario anticipated, overrun accounts could total 331 KAF (about 1.2 percent of active Lake Mead storage). This could translate into an elevation change as great as 5 feet. It should be stressed that, this is the most extreme scenario anticipated, and would occur only infrequently, if at all. Historically, Lake Mead low water levels have dropped to the minimum rated power elevation (1,083 feet msl) of the Hoover Powerplant during two periods (1954 to 1957 and 1965 to 1966). The maximum Lake Mead water surface elevation of approximately 1,225.6 feet msl occurred in only one year, 1983. The potential elevation change from combined IOP and IA effects is anticipated to be within the historic fluctuation and the fluctuation that would be seen under No-Action.

Implementation of the IOP, in addition to the IA, does not significantly decrease the probability of exceeding key Lake Mead elevations. Table 3.1-8 compares probabilities of exceedance for the No-Action, IA, and combined IA and IOP.

Table 3.1-8. Comparison of Probability of Lake Mead Exceeding Key Elevations for the No-Action Alternative, IA, Combined IA and IOP

Scenario	*Exceed 1083 Years 2002-2010*	*Below 1083 After Year 2010*	*Exceed 1050 Years 2002-2017*	*Below 1050 After Year 2017*	*Exceed 1000 Years 2002-2049*	*Below 1000 After Year 2049*
No-Action	100%	44%	100%	38%	100%	6%
IA	100%	44%	100%	38%	100%	6%
IA and IOP (average)	100%	44%	100%	38%	100%	6%

IMPACTED COLORADO RIVER REACHES

Hoover Dam to Parker Dam. The IA and adoption of the IOP would cause only minor changes to flows between Hoover Dam and Parker Dam relative to No-Action. These minor changes are due to reduced water orders for California under surplus conditions for the IA, and the augmentation/depletion of flows during IOP overrun and payback periods.

To assess changes in river flow, a representative location, Lake Havasu NWR, was selected. Figure 3.1-5 compares annual flow volumes past Lake Havasu NWR for the IA and No-Action. Flows under the IA and No-Action are extremely similar for all percentiles. As shown by the 50th percentile values, annual flow volumes are expected to gradually decline over time under both the IA and No-Action due to decreasing probability of surplus conditions, as well as increasing probability of shortage conditions.

4. Equalization between Lake Mead and Lake Powell does not necessarily occur in every year. Equalization is not required when there is insufficient storage in the Upper Basin per the Colorado River Basin Project Act. By assuming there is not equalization with Powell, this analysis assumes that the IOP could result in a greater decrease in Lake Mead elevations than may actually occur.

Figure

3.1-5 Modeled Annual Flow at Havasu National Wildlife Refuge, Comparison of the No-Action and IA Alternatives

Hourly flows fluctuate with power releases, and the IA is not expected to have any impact on these short-term operations at either Hoover, Davis, or Parker Dams; therefore it would have no impact on short-term fluctuations in river reaches downstream of Hoover Dam.

Further, although Lake Mohave/Davis Dam and Lake Havasu/Parker Dam are within the potentially impacted area, by virtue of their operating rule curves and short-term operational objective, the IA would have no impact on the operation of these facilities.

With implementation of the IOP, the average increase in annual flow during overruns from Hoover to Parker Dam would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.8 percent and an increase over flows under No-Action as great as 1.1 percent[5]. This would increase groundwater levels and increase backwater surface area. The average decrease in flow due to paybacks would be roughly 72 KAF, or 0.6 percent less than average annual historic flows and 0.8 percent less than under No-Action. Assuming the most extreme scenario, annual flows from Hoover Dam to Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 206 KAF. However, these represent the most extreme annual flow changes anticipated.

Parker Dam to Imperial Dam. It is in this reach of the river that adoption of the proposed action would have the most impact. Future flows in this reach would be impacted by the IA because proposed transfers of conserved water by IID to SDCWA and MWD would change the point of diversion from the river. The net impact of the IA would be to move between 183 and 388 KAFY of diversion from Imperial Dam to Parker Dam, thus reducing flows and river stage in this reach. As discussed previously, a reduction in flow of 400 KAFY from Parker Dam could result in a lowering of river stage by approximately 0.4 feet at some locations. Further explanation of this analysis is given in Appendix J. Figures 3.1-6 and 3.1-7 illustrate annual flow volume of the river at Headgate Rock Dam (between Parker and Palo Verde Diversion dams) and Palo Verde Diversion Dam, under No-Action conditions and the IA, in terms of the 90th, 50th, and 10th percentile. At both locations, under higher flow conditions (90th percentile) flows under the IA and No-Action are extremely similar. For the 50th and 10th percentile values, flows under the IA and No-Action are also similar, with flows slightly lower under the IA. These reduced flows would result from IA transfer agreements that cause water to be diverted at Parker Dam rather than left to flow in the river for diversion at Imperial Dam.

The reduction in flows due to the IA could result in a decrease in open water in the main river, loss of backwaters, and loss of vegetation in backwaters in the Parker to Imperial reach. The BO (FWS 2001) found that the greatest effect, due to the change in point of diversion of 400 KAF, would occur in April. As much as 35 surface acres of the open water in the main channel, 17 surface acres of open water in backwaters, and 28 acres of emergent vegetation in backwaters could be lost due to implementation of the IA.

5. Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Havasu National NWR.

Figure

3.1-6 Modeled Annual Flow at Headgate Rock Dam, Comparison of the No-Action and IA Alternatives

Figure

3.1-7 Modeled Annual Flow at Palo Verde Diversion Dam, Comparison of the No-Action and IA Alternatives

IOP impacts below Parker Dam are due to IID/CVWD overruns and use in excess of 420 KAF by PVID/YPRD users as well as payback actions by IID/CVWD (payback measures by MWD do not impact this reach).

With implementation of the IOP, the average increase in annual flow would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.9 percent and an increase over flows under No-Action as great as 1.3 percent[6]. This would increase groundwater levels and increase backwater surface area. The average decrease in flow would be roughly 63 KAF, or 0.7 percent less than average annual historic flows and 0.9 percent less than under No-Action. Assuming the worst-case scenario, annual flows below Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 176 KAF. However, these represent the most extreme possible annual flow changes.

GROUNDWATER

Refer to section 3.1.2, *Proposed Action, General Colorado River, Groundwater*, above.

WATER QUALITY

Refer to 3.1.2, *Proposed Action, General Colorado River, Water Quality*, above.

SERVICE AREAS

Imperial Irrigation District. With full implementation of the IA and QSA, IID's Colorado River water diversion for use in its service area could be reduced as much as 300 KAF annually and any water used to satisfy miscellaneous PPRs and Federal Reserved Rights[7]. IID plans to accomplish this level of conservation by both voluntary on-farm conservation and system improvements as discussed in section 2.2.1. IID's overall Colorado River diversion would be reduced by 368 KAF (reduced by 300 KAFY from the conservation and transfer agreements and reduced another 67.7 KAFY through lining of the AAC). The AAC lining was addressed in a project-specific EIS/EIR certified in 1994 (USBR and IID 1994).

Implementation of conservation measures has a beneficial impact on some water constituents in the IID service area and a negative effect on other constituents. The three water bodies of concern with regard to IID drainage are the Alamo and New Rivers and the Salton Sea. With implementation of proposed conservation measures in IID, both volume and concentration of silt in the Alamo and New rivers and Salton Sea will decrease. Because pesticides, herbicides, and nutrients tend to concentrate in sediments, this decrease in silt is expected to lead to a decrease in pesticide, herbicide, and nutrient concentration and load in the Alamo and New Rivers and Salton Sea. Therefore, the proposed conservation measures are consistent with the

6. Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Headgate Rock Dam.
7. Under the QSA, CVWD, IID and MWD have agreed, when necessary, to divide responsibility for foregoing the use of Colorado River water to satisfy future water demands by holders of Miscellaneous PPRs and Federal Reserved Rights. Water would be forborne by CVWD and IID in the amount of 3 and 11.5 KAFY, respectively, when necessary, for use by Miscellaneous PPRs and Federal Reserved Rights holders. Water would be forborne, when necessary, by MWD in the aggregate amount in excess of 14.5 KAFY necessary to satisfy Miscellaneous PPRs and Federal Reserved Rights holders. Diversions to satisfy Miscellaneous PPRs and Federal Reserved Rights holders will be along the lower Colorado River from Davis Dam to below Imperial Dam.

intent of the proposed silt and pesticide TMDLs (Alamo and New Rivers) and nutrient TMDLs (New River and Salton Sea). However, the conservation measures increase both concentration and load of selenium and salinity in these water bodies. Selenium and salt enter these water bodies when agricultural operations flush the root zone, a practice that may increase with certain conservation measures. It is unclear how to achieve the benefits of conservation (reduction in silt, nutrient, pesticide, and herbicides) without the adverse increase in selenium and salt. Implementation of TMDLs for selenium and salt may impose even greater restrictions on irrigation and may make some farming and conservation measures infeasible. This is described in detail in the IID Water Conservation and Transfer Project EIR/EIS.

Coachella Valley Water District. The IA would increase the amount of Colorado River water that could potentially be diverted by CVWD in a normal year. This increase is within the historic range of Colorado River water diverted by CVWD. Implementation of the IA would result in an increase between 55 and 155 KAFY available for use in the service area in a normal year by CVWD. CVWD's overall Colorado River diversion would be increased by 29 (assuming CVWD receives none of the first or second 50 KAFY from the CVWD/IID/MWD Water Conservation and Transfer Agreement) to 129 KAF (increased by 0 to 100 KAFY through the CVWD/IID/MWD Water Conservation and Transfer Agreement, increased 120 KAFY per changes to the IID/MWD/PVID/CVWD 1989 Approval Agreement, and 35 KAFY from the CVWD/MWD SWP Transfer and Exchange, less 26 KAFY gained through Coachella Canal Lining). The increase in deliveries and diversions of Colorado River Water for CVWD would be reduced by water used to satisfy miscellaneous PPRs and Federal Reserved Rights[8].

This water would be used in place of local groundwater and would, therefore, reduce the need to use groundwater to meet demand. In conjunction with the CVWMP, this would ameliorate the current groundwater overdraft, result in an increase in drainage flows to the Salton Sea and improve water quality in surface drains. The reduction in groundwater use would be a beneficial impact. The CVWMP and IA would result in groundwater inflows increasing by 23 percent by the year 2015 and 38 percent by the year 2035, relative to 1999 (unpublished data CVWD). These increased flows are due primarily to groundwater recharge up to 146 KAFY. Without the CVWMP and IA, inflows to groundwater are anticipated to increase by only 4 percent in year 2015 and 10 percent by year 2035, primarily due to an increase in return flows (unpublished data CVWD). These increased inflows have considerable beneficial effects on groundwater elevations. In the Upper Valley, without the recharge facilitated by the IA, groundwater, depending on location would drop by as little as 10 feet or drop by as much as 225 feet (unpublished data CVWD). With recharge and other projects of the CVWMP, groundwater in the Upper Valley would drop no more than 20 feet and in some locations could increase by as much as 40 feet (unpublished data CVWD). A similar beneficial impact is seen in the Lower Valley, where without recharge, groundwater levels could drop by 65 to 180 feet by year 2035 relative to 1999 levels (unpublished data CVWD). With groundwater recharge per the proposed action, groundwater elevations in the Lower Valley would increase by 5 to 90 feet by year 2035 relative to levels in 1999 (unpublished data CVWD).

Changes to salinity, resulting from the CVWMP, which is facilitated by the IA are summarized in Table 3.1-9. As shown in this table, with the CVWMP, salt will generally increase in the Upper Valley relative to the Baseline until year 2015 and then will remain the same as baseline from year 2035 to 2075 (unpublished data CVWD). This adverse impact is due to added recharge and canal water use in the Upper Valley. However, in the Lower Valley there would be a net salt decrease of up to 37,000 tons/year by year 2035 and a net removal of salt of about

8. Under the QSA, CVWD, IID and MWD have agreed, when necessary, to divide responsibility for foregoing the use of Colorado River water to satisfy future water demands by holders of Miscellaneous PPRs and Federal Reserved Rights. Water would be forborne by CVWD and IID in the amount of 3 and 11.5 KAFY, respectively, when necessary, for use by Miscellaneous PPRs and Federal Reserved Rights holders. Water would be forborne, when necessary, by MWD in the aggregate amount in excess of 14.5 KAFY necessary to satisfy Miscellaneous PPRs and Federal Reserved Rights holders. Diversions to satisfy Miscellaneous PPRs and Federal Reserved Rights holders will be along the lower Colorado River from Davis Dam to below Imperial Dam.

96,000 tons by year 2075 (unpublished data CVWD). This decrease in salts would result from increased drain flows that remove salts from the basin (unpublished data CVWD).

The increase in salt and TDS concentrations in the Upper Valley represent an adverse change in groundwater quality that could affect water practices. Some users in the Upper Valley could have harder water, which could slightly reduce the life of appliances and increase the use of soaps and detergents. In the Lower Valley, the annual rate of salt increase would be lower than 1999 conditions and year 2035 Baseline conditions.

Other water quality parameters may also be affected by implementation of the CVWMP. At this time data is insufficient to prepare detailed projections, but general estimates can be made. In the Upper Valley the use of SWP exchange water could increase calcium and sulfate concentrations, but it is unlikely that MCLs for these contaminants would be exceeded. In the Lower Valley the concentrations of most inorganic constituents could decrease with implementation of the CVWMP. This reduction would be due to increased drain flows and increased salt flushing. However, it is possible that there will be localized increases in salts in the Oasis area where agricultural users would rely on more canal water. Because neither SWP water, Colorado River water, nor CVWD groundwater exceed MCLs related to metals and trace organics it is anticipated that no major changes related to these constituents would occur with implementation of the CVWMP. Increased use of Colorado River water could increase the concentration of selenium in drain flows, potentially exceeding the EPA Aquatic Life Criteria, Criterion Continuous Concentration of 5 μg/L.

Recharge with Colorado River water could introduce low levels of perchlorate into the groundwater near recharge basins. Perchlorate is an inorganic compound used as an oxidant in solid rocket propellants that interferes with the thyroid gland. Perchlorate enters the Colorado River from industrial drainage into Las Vegas Wash, a tributary to Lake Mead, and has recently been detected at levels of 4 to 6 ppb in Colorado River water delivered to the Coachella Valley. The recent installation of facilities to treat drainage from Las Vegas Wash is expected to significantly reduce the level of perchlorate in Colorado River water.

The above data presented for Coachella Valley groundwater changes is based on preliminary studies; a more complete and refined analysis will be contained in a separate PEIR for the CVWMP.

The project-specific aspects of the canal lining were addressed in a separate EIS/EIR by Reclamation and CVWD (USBR and CVWD 2001).

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Table 3.1-9. Projected Salt Balance in the Coachella Valley with Implementation of the CVWMP

Landscape, 1 page

Metropolitan Water District. Without implementation of the IA, in a normal year MWD has the ability to divert a total of 660 KAF of Colorado River water, 550 KAF of which is Priority 4 water and approximately 110 KAF of which is IID conserved water. With implementation of the IA, in a normal year, MWD would have the ability to divert a total of 883 to 986.6 KAFY, of which 130 to 200 KAFY would be exchanged for water which would be delivered to SDCWA). The water transferred to MWD by IID would replace the unused apportionment water that was previously diverted by MWD but which would not be available in the future as other States begin to use their full entitlement. The ability to divert other priority and surplus water would not change under the IA, with the exception of the quantification of Priority 6a water for CVWD and IID, and the ability of MWD to divert a quantity of Priority 6a water. The 883 to 986.6 KAFY that MWD could divert from the Colorado River could be reduced as necessary to meet miscellaneous PPRs and Federal Reserved Rights[9].

Implementation of the IA would not increase Colorado River water diversions through MWD facilities as conserved water would be substituted for surplus or unused Arizona or unused Nevada water. The implementation of the IA program components and CVWD use of the First and Second 50 KAFY would result in a substitution of Priority 3a Colorado River diversions at the CRA intake of 239 to 274 KAFY[10]. The implementation of the IA program components, in the event that CVWD would forgo its use of the First and Second 50 KAFY, would result in a substitution of Priority 3a Colorado River diversions at the CRA intake of 339 to 374 KAFY[11].

On May 23, 2001, the State of Arizona and MWD entered into an agreement that creates specific contractual responsibilities between MWD and the State of Arizona regarding implementation of the ISG. In a future shortage year, MWD would reduce its order for Colorado River water. The water intentionally forborne by MWD would be made exclusively available for consumptive use in the State of Arizona under Article II(B)(6) of the Decree in *Arizona v. California*. MWD would intentionally forbear a cumulative total of one MAF of water for the benefit of the State of Arizona, with a 500 KAF yearly maximum. This agreement would reduce the impact of shortages to the State of Arizona. Likewise, this agreement would increase the

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9. Under the QSA, CVWD, IID and MWD have agreed, when necessary, to divide responsibility for foregoing the use of Colorado River water to satisfy future water demands by holders of Miscellaneous PPRs and Federal Reserved Rights. Water would be forborne by CVWD and IID in the amount of 3 and 11.5 KAFY, respectively, when necessary, for use by Miscellaneous PPRs and Federal Reserved Rights holders. Water would be forborne, when necessary, by MWD in the aggregate amount in excess of 14.5 KAFY necessary to satisfy Miscellaneous PPRs and Federal Reserved Rights holders. Diversions to satisfy Miscellaneous PPRs and Federal Reserved Rights holders will be along the lower Colorado River from Davis Dam to below Imperial Dam.
10. The 239 to 274 KAFY of Priority 3a water to be substituted for previously diverted unused apportionment and surplus water comes from: 200 KAFY for exchange with SDCWA per the IID/SDCWA Water Conservation and Transfer Agreement; plus 56.2 KAFY from the AAC lining; plus 21.5 from the Coachella Canal lining; plus 16 KAFY for delivery to San Luis Rey Indian Water Rights Settlement Parties; and less 20 KAFY to CVWD per changes to the IID/MWD/PVID/CVWD 1989 Approval Agreement proposed under the QSA. To evaluate the most extreme change in point of diversion, this analysis assumed the 35 KAFY from the CVWD/MWD SWP Transfer & Exchange would be diverted at the CRA. If the 35 KAFY were instead diverted at the AAC, CRA diversion would be decreased by 35 KAFY.
11. The 339 to 374 KAFY of Priority 3a water to be substituted for previously diverted unused apportionment and surplus water comes from: 100 KAFY from the CVWD/IID/MWD Water Conservation and Transfer Agreement; 200 KAFY for exchange with SDCWA per the IID/SDCWA Water Conservation and Transfer Agreement; plus 56.2 KAFY from the AAC lining; plus 21.5 from the Coachella Canal lining; plus 16 KAFY for delivery to SLR Indian Water Rights Settlement parties; and less 20 KAFY to CVWD per changes to the IID/MWD/PVID/CVWD 1989 Approval Agreement proposed under the QSA. To evaluate the most extreme change in point of diversion, this analysis assumed the 35 KAFY from the CVWD/MWD SWP Transfer & Exchange would be diverted at the CRA. If the 35 KAFY were instead diverted at the AAC, CRA diversion would be decreased by 35 KAFY.

impact of shortages to the MWD service area. Full details of this agreement can be found at www.water.az.gov/publications /surplus_guidelines.html.

San Diego County Water Authority. The IA would have a beneficial impact to the SDCWA service area by making water supplies more reliable. With the implementation of the IA, SDCWA would receive, by exchange with MWD, up to 200 KAFY of water. This would replace water previously purchased by SDCWA from MWD; SDCWA would not receive any additional water beyond what it is currently receiving.

Arizona. Changes to water supply available to Arizona with implementation of the IA would be extremely minimal. Table 3.1-10 makes specific comparisons of the No-Action condition and IA. This table illustrates that Arizona is basically unimpacted by the IA. For all periods (Interim Surplus, Years 2017 to 2076), under the IA, Arizona would meet normal supplies with the same frequency as under the No-Action Alternative, shortage conditions would occur with the same frequency, and surplus would be available just as often. The magnitude of surplus conditions and shortage conditions would be the same for the No-Action condition and IA.

Table 3.1-10. Summary of Arizona Water Supply Conditions, Comparison of the No-Action Alternative and IA

	Interim Surplus Period		Years 2017 to 2076		Years 2002 to 2076	
	No Action	*IA*	*No Action*	*IA*	*No Action*	*IA*
Percent time normal supplies met or exceeded [a]	70	70	37	38	44	44
Percent time surplus supplies delivered [b]	23	23	18	18	19	19
Maximum surplus delivery	3.21 MAFY	3.21 MAFY	3.24 MAFY	3.24 MAFY	3.24 MAFY	3.24 MAFY
Percent of time shortage conditions	30	30	63	62	56	56
Minimum shortage delivery	2.37 MAFY	2.37 MAFY	1.41 MAFY	1.41 MAFY	1.41 MAFY	1.41 MAFY

[a] This row includes the percent of time normal and surplus supplies are delivered.
[b] Per the ISG there are several different levels of surplus, including Partial Domestic Surplus (when Lake Mead) is between 1125 and 1145 feet msl, Full Domestic Surplus (when Lake Mead is above Elevation 1145 feet msl but below the 70R strategy, Quantified Surplus (when water would be spilled per the 70R strategy), and the Flood Control Surplus. Under some categories of surplus, water is not taken by Arizona, for this reason the "Percent of time surplus supplies available" varies between California, Arizona, and Nevada.

On May 23, 2001, the State of Arizona and MWD entered into an agreement that creates specific contractual responsibilities between MWD and the State of Arizona regarding implementation of the ISG. In a future shortage year, MWD would reduce its order for Colorado River water. The water intentionally forborne by MWD would be made exclusively available for consumptive use in the State of Arizona under Article II(B)(6) of the Decree in *Arizona v. California*. MWD would intentionally forbear a cumulative total of one MAF of water for the benefit of the State of Arizona, with a 500 KAF yearly maximum. This agreement would reduce the impact of shortages to the State of Arizona. Full details of this agreement can be found at www.water.az.gov/publications/surplus_guidelines.html.

Nevada. Changes to water supply available to Nevada with implementation of the IA would be extremely minimal. Table 3.1-11 makes specific comparisons of the No-Action condition and IA. This table illustrates that Nevada would have about the same amount of water available under the IA as compared to No-Action. For all periods (Interim Surplus, Years 2017 to 2076) under the IA, Nevada would meet normal supplies more frequently than under the No-Action condition, shortage conditions would occur less frequently, and surplus would be available slightly more frequently. Also the magnitude of surplus conditions and shortage conditions would be similar for the No-Action condition and IA.

Table 3.1-11. Summary of Nevada Water Supply Conditions, Comparison of No-Action and IA

	Interim Surplus Period		Years 2017 to 2076		Years 2002 to 2076	
	No Action	*IA*	*No Action*	*IA*	*No Action*	*IA*
Percent time normal supplies met or exceeded [a]	89	92	37	38	48	49
Percent time surplus supplies delivered [b]	84	86	18	18	31	32
Maximum surplus delivery	390 KAFY	390 KAFY	514 KAFY	514 KAFY	514 KAFY	514 KAFY
Percent of time shortage conditions	Less than 11	Less than 8	Less than 63	Less than 62	Less than 52	Less than 51
Minimum shortage delivery	282.3 KAFY	282.3 KAFY	236.3 KAFY	236.3 KAFY	236.3 KAFY	236.3 KAFY

[a] This row includes the percent of time normal and surplus supplies are delivered.

[b] Per the ISG there are several different levels of surplus, including Partial Domestic Surplus (when Lake Mead is between 1,125 and 1,145 feet msl), Full Domestic Surplus (when Lake Mead is above elevation 1,145 feet msl but below the 70R strategy), Quantified Surplus (when water would be released per the 70R strategy), and the Flood Control Surplus. Under some categories of surplus, water is not taken by Arizona, for this reason the "Percent of time surplus supplies available" varies between California, Arizona, and Nevada.

SALTON SEA

With implementation of the IA and QSA, IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change (if fallowing is the sole conservation method used and if additional fallowing is implemented to compensate for reduced inflows) to a reduction of as much as about 300 KAFY. Under the maximum impact scenario (300 KAFY conserved and all transferred out of the valley), the reduced inflow would increase salinity to as high as 163,500 mg/L by the end of the 75-year study period, and reduce water surface elevations to about–250 feet over the same period (personal communication, P. Weghorst, USBR 2001). In addition to the water conserved for transfer purposes, additional conservation by IID would be required to comply with IID's Priority 3a cap on diversions and the IOP. These actions could have additional effects on reduced inflow to the Salton Sea.

Implementation of Biological Conservation Measures

The potential impacts to hydrology, water quality, and water supply resulting from the biological conservation measures are uncertain. Creation of 44 acres backwater, Tier 1 conservation measures including soil moisture maintenance, as well as Tier 2 conservation measures including restoration, revegetation, and maintenance of habitat are all planned within the Parker to Imperial reach of the Colorado River. These actions could result in the removal of some water from the mainstem of the Colorado River, as well as some dredging and construction activities. All biological conservation measures would be subject to site-specific NEPA review. Anticipated impacts include reduced flow in the mainstem of the river in the Parker to Imperial reach as well as water quality impacts during construction.

Mitigation Measures

The impact analysis identified potential impacts from the proposed action related to:

- Reduced flows due to the IA resulting in a decrease in backwater and loss of vegetation in the Parker Dam to Imperial Dam reach of the Colorado River;
- Increased selenium and salt concentrations in the New and Alamo rivers and the IID drains resulting from IID conservation actions. These increased concentrations complicate the ability to meet proposed TMDL's for selenium in the Alamo River and IID drains and the TMDL for salt in the Salton Sea;
- Acceleration of Salton Sea decline relative to elevation, surface area, and salinity;
- Increase in selenium of CVWD drainage water;
- Increased salinity in the CVWD Upper Valley aquifer and near groundwater recharge areas due to implementation of the CVWMP; and
- Potential to introduce perchlorate into the CVWD groundwater.

COLORADO RIVER

The biological conservation measures included as part of the proposed action were developed to mitigate impacts of the changes in point of delivery of Colorado River water and thus the reduced flows from Parker Dam to Imperial Dam that would occur as part of the proposed action. Mitigation measures specifically related to implementation of biological conservation measures would be developed as part of site-specific review.

IMPERIAL IRRIGATION DISTRICT AND COACHELLA VALLEY WATER DISTRICT

Water Quality. Changes to water quality of the New River, Alamo River, IID and CVWD drains, and CVWD groundwater, as well as the Salton Sea stem from actions largely outside of Reclamation's authority. The IID Water Conservation and Transfer Project EIR/EIS examined many methods for dealing with salt and selenium in these water bodies, including the use of physical and chemical methods to remove selenium from drain water and methods to mitigate for biological impacts that result from water quality changes. IID determined that existing technologies for selenium removal would not provide a feasible solution to the problems posed by high selenium concentrations in tilewater. According to the IID Water Conservation and Transfer EIR/EIS, IID would mitigate impacts to wildlife predicted to result from increased selenium in the drains through the creation of alternative habitat rather than meeting a specific numeric water quality target in the drains. This approach is appropriate for several reasons. First, selenium concentrations in some IID drains and at some points of discharge to the Salton Sea currently exceed the current aquatic life criterion of 5 μg/L. Requiring achievement of 5 μg/L would impose a greater mitigation obligation than the impact attributable to water conservation. Second, concerns regarding selenium concentrations in the drains relate to its potential toxicological effects to wildlife. IID's approach to mitigating impacts of increased selenium would create sufficient alternate habitat for species using the drains to offset reduced reproductive output of wildlife using the drains.

However, it is unclear how this approach would affect the ability to meet selenium TMDL's for the Alamo River and IID drains. Correspondence with IID indicates that that the proposed selenium TMDLs would focus on the Colorado River shed and would help prevent selenium from entering the Imperial Valley, but would also require the management of selenium within Imperial Valley.

No feasible mitigation measures were identified for reducing selenium and salt water quality impacts to the New River, Alamo River and IID drains.

CVWD Groundwater. Potential affects of the proposed action within the CVWD service area are related to local actions and decisions made by CVWD. CVWD evaluated the feasibility of reducing the TDS of water used for groundwater recharge. CVWD considered such options as construction of an extension of the SWP into the Coachella Valley and the construction of desalination facilities, but found both options to have adverse environmental impacts and both were deemed financially infeasible.

Recharge with Colorado River water could introduce low levels of perchlorate into the groundwater near the recharge basins. Perchlorate has recently been detected at levels of 4 to 6 ppb in Colorado River water delivered to the Coachella Valley. The recent installation of facilities to treat drainage from Las Vegas Wash is expected to significantly reduce the level of perchlorate in Colorado River water. Should recharge of Colorado River water cause any Torres Martinez drinking water well to exceed any recognized health based water quality standard, CVWD would work with the Torres Martinez Band of Desert Cahuilla Indians to bring the drinking water supply of the Tribe into compliance by either providing domestic water service to the Tribe from CVWD's domestic water system or by providing appropriate well-head treatment.

SALTON SEA

IID developed the Salton Sea Conservation Strategy to mitigate impacts on the salinity of the Salton Sea that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. The Salton Sea Conservation Strategy was developed to mitigate biological impacts related to increased salinity, but would also affect hydrology. With implementation of the Salton Sea Conservation Strategy, the Sea would be maintained at elevations at or above the No Action condition until at least the year 2030. After that time, reduced inflow would cause the Sea to decline to about elevation -240 feet msl by the year 2077, compared to the No Action elevation of -235 feet msl. This would result in the exposure of land that has been inundated by the Sea.

Residual Impacts

The biological conservation measures included as part of the proposed action would mitigate impacts of the changes in point of delivery of Colorado River to vegetation along the river between Parker Dam and Imperial Dam.

IID's proposed creation of additional wildlife habitat would mitigate impacts to biological resources from increased selenium concentrations in the New and Alamo rivers and IID drains, but would not mitigate impacts to water quality.

The proposed provision of water or well-head treatment would mitigate impacts to tribal resources from potential exceedance of perchlorate standards in groundwater of the Torres Martinez Band of Desert Cahuilla Indians.

No feasible mitigation measures were identified for water quality impacts to the Alamo River, IID and CVWD drains, and Upper Valley CVWD aquifer.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

Under this IOP alternative, overrun accounts would not be forgiven in the event of a flood control release, rather all overruns would be paid back.

In most respects, the proposed action and “No Forgiveness Alternative” are nearly identical, although with “No Forgiveness” payback periods, and thus periods of reduced flow and reduced river stage, could be extended relative to the proposed action. The exact increase in the number of potential payback years is uncertain, again dependent upon a flood event coinciding with a period when entities have overrun account balances.

For both IOP alternatives an essential element is payback. For both IOP alternatives the different payback scenarios allow Reclamation to balance the needs of keeping certain elevations in Lake Mead while maintaining downstream flows. As described earlier, when an entity is in overrun, flows downstream from Hoover Dam would be increased and the volume in Lake Mead would be reduced. When an entity entered payback, the entity would decrease the water it requested released from Lake Mead, thus increasing the volume of Lake Mead, while decreasing flows in the Colorado River.

It is important to recognize that the difference between the Forgiveness and No-Forgiveness alternatives occurs in the years following a flood control release. With both alternatives river flows would be increased when an overrun is incurred and decrease during payback. Under “No-Forgiveness”, following a flood release, an entity is required to continue payback and thus river flows would be reduced. With "Forgiveness," following a flood release, entities are not required to continue payback and river flows would not be reduced.

GROUNDWATER

Impacts to groundwater would be the same as those described for the proposed action.

WATER QUALITY

Impacts to water quality would be the same as those described for the proposed action.

Mitigation Measures

Mitigation measures are the same as those described for the proposed action.

Residual Impacts

Residual impacts would be the same as those described for the proposed action.

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3.2 BIOLOGICAL RESOURCES

3.2.1 Affected Environment

Colorado River

The following information is summarized from baseline technical reports prepared for the MSCP, the *Biological Assessment, Interim Surplus Criteria, Secretarial Implementation Agreements, Water Administration, and Conservation Measures on the Lower Colorado River-Lake Mead to the Southerly International Boundary* (USBR 2000a), baseline information from the Salton Sea EIS/EIR, and other relevant literature and reports. This section focuses on the lower portion of the Colorado River within the U.S. Information regarding potential impacts to biological resources in Mexico is included in section 3.12, Transboundary Impacts.

Vegetation

Vegetation along the lower portion of the Colorado River was historically dominated by cottonwood-willow riparian forest. This plant community requires periodic flooding for short periods of time for seed germination and establishment. The events that are necessary to the continued regeneration of this plant community are generally absent on the present-day Colorado River because flows are controlled through the use of reservoirs. Existing stands of cottonwood-willow riparian forest are considered relict and, for the most part, are not expected to persist over the next several decades, unless focused management plans are initiated.

Present-day vegetation is largely dominated by salt cedar (*Tamarix ramesissima*), an invasive exotic weed species that provides little habitat value. It displaces native vegetation by competing for water and causing a build-up of salt on the surface of the ground. Salt cedar grows in pure stands in washes, streams, and ditches, and can establish quickly. Associations with honey mesquite (*Prosopis glandulosa*) and screwbean mesquite (*Prosopis pubescens*) are present in some areas, particularly on higher floodplain areas, but salt cedar appears to take over areas as other plants die.

Upland areas adjacent to the Colorado River are dominated by desert plant communities, most commonly creosote bush scrub. The primary component of this plant community is creosote bush (*Larrea tridentata*), although several other smaller shrub and succulent species are commonly found in association with this plant community including white bursage (*Ambrosia dumosa*), brittle bush (*Encelia farinosa*), cheesebush (*Hymenoclea salsola*), saltbush (*Atriplex* spp.), and chollas (*Opuntia* spp.). Creosote bush scrub grades into saltbush scrub in areas that experience occasional flooding and have higher levels of salt. Many species of saltbush can be found in saltbush scrub including allscale (*Atriplex polycarpa*), shadscale (*A. confertiflora*), and four-wing saltbush (*A. canescens*). Much of the area formerly dominated by saltbush scrub has been converted to agricultural use.

A distinctive desert wash woodland community occurs on deep, sandy soils in canyons, on alluvial fans, and along normally dry stream courses (arroyos) throughout the Colorado Desert, including the Colorado River Valley within the Lower Basin. The vegetation is open woodland characterized by drought-resistant deciduous shrubs and trees whose deep roots enable them to reach the water that percolates seasonally through sandy soils along drainages. Typically dominant species include catclaw (*Acacia greggii*), palo verde (*Cercidium floridum*), desert willow (*Chilopsis linearis*), smoke tree (*Dalea spinosa*), desert lavender (*Hyptis emoryi*), ironwood (*Olneya tesota*), and mesquite (*Prosopis juliflora*). The wetter and more poorly drained areas are likely to support invasive tamarisk or salt cedar (*Tamarix* spp.).

Reclamation (2000a) has estimated that there are approximately 13,900 acres of salt cedar-honey mesquite, over 30,000 acres of salt cedar, and 5,000 acres of salt cedar-screwbean mesquite within the area from Parker Dam to Imperial Dam. Only approximately 3,000 acres of honey mesquite and 1,500 acres of cottonwood-willow habitat exist in a relatively undisturbed form.

Early photographs of the lower portion of the Colorado River show that vast riparian forests were once present. Reclamation sponsors a riparian restoration program along the River, including native plant nurseries and demonstration projects. Reclamation is also a participant in the MSCP, described in section 1.5.2. The restoration of areas adjacent to the lower portion of the Colorado River to native vegetation and habitats does and will provide habitat for special status ("sensitive") species of plants and animals.

Fish and Wildlife

The lower portion of the Colorado River supports hundreds of species of wildlife. Over 100 of these are special status species. Large numbers of more common species of mammals, fish, birds, reptiles, and amphibians either breed or migrate to this area and depend on it for their habitat requirements. It is an extremely important migratory corridor for birds, especially waterfowl. Riparian and wetland areas sustained by the River support a wide variety of raptors, including sharp-shinned hawk (*Accipiter striatus)*, Cooper's hawk (*Accipiter cooperii)*, northern harrier (*Circus cyaneus)*, red-tailed hawk (*Buteo jamaicensis)*, rough-legged hawk (*Buteo lagopus johannis)* common black-hawk (*Buteogallus anthracinus),* Harris' hawk (*Parabuteo unicinctus),* bald eagle (*Haliaeetus leucocephalus)*, golden eagle (*Aquila chrysaetos)*, white-tailed kite (*Elanus leucurus)*, Mississippi kite (*Ictinia mississippiensis)*, American kestrel (*Falco sparverius)*, prairie falcon (*Falco mexicanus)* and peregrine falcon (*Falco peregrinus*). Egrets, herons, flycatchers, and woodpeckers are especially well represented along the River. Mammals, including the Colorado River cotton rat (*Sigmodon arizonae plenus*) and more than a dozen species of bats, are also found here. Reptiles and amphibians include Colorado River toad (*Bufo alvarius)*, Arizona toad (*Bufo microscaphus microscaphus*), several species of leopard frog (*Rana* spp*.)*, banded Gila monster (*Heloderma suspectum cinctum)*, chuckwalla (*Sauromalus obesus)*, Sonoran mud turtle (*Kinosternon sonoriense)*, desert tortoise (*Gopherus agassizii)*, and desert rosy boa (*Lichanum trivirgata gracia)*.

Backwater areas are important to native fish, because substantial changes within the main channel have rendered this area unsuitable for most of the species discussed below. Backwater habitats also support a variety of other wildlife, especially clapper rails, flycatchers and warblers, woodpeckers, and waterfowl.

Very few native fishes existed historically in the lower portion of the Colorado River. These include the following riverine taxa:

Woundfin (*Plagopterus argentissimus*)

Roundtail chub (*Gila robusta*)

Colorado River pikeminnow (*Ptychocheilus* lucius)

Humpback chub (*Gilia cipha*)

Speckled dace (*Rhinichthys osculus*)

Flannelmouth sucker (*Catostomus latipinnis*)

Bluehead sucker (*Catostomus discobolus*)

Bonytail (*Gila elegans*)

Razorback sucker (*Xyrauchen texanus*)

Desert pupfish (*Cyprinodon macularius*)

Documented non-native fishes introduced in the Colorado River from Lee Ferry downstream include the following:

Threadfin shad (*Dorosoma petenense*)

Common Carp (*Cyprinus carpio*)

Red shiner (*Cyprinella lutrensis*)

Northern squawfish (*Ptychocheilus oregonense*)

Bullhead catfish (*Ameiurus* spp.)

Channel catfish (*Ictalurus punctatus*)

Flathead catfish (*Pylodictis olivaris*)

Brook trout (*Salmo trutta*)

Brown trout (*Salvelinus fontinalus*)

Rainbow trout (*Onchorhynchus mykiss*)

Northern pike (*Esox lucius*)

Livebeares (*Gambusia affinis, Xiphophorus* spp, *Poecilia* spp)

Sunfishes (*Lipomis* spp)

Largemouth bass (*Micropterus salmoides*)

Smallmouth bass (*Micropterus dolomieui*)

Crappies (*Pomoxis annularis, P. nigromaculatus*)

African cichlids (*Oreochromis* spp, *Tilapia* spp)

Striped bass (*Morone saxatilis*)

Most of the riverine native fishes have been extirpated from the study area. The razorback sucker is currently being reintroduced and is the only native fish in notable numbers in the Colorado River between Hoover and Imperial Dams. Bonytail have been reintroduced in Lake Havasu, which is formed by Parker Dam, and may occur in the study area, but they have not been documented to date. The fish community in the study area is dominated by non-native fish, which provide a substantial sport fishery. Predation and competition by non-native fish has been identified as one of the major reasons for the demise of the native fish populations in the lower portion of the Colorado River.

Federal Special Status Species

Plants. No federally listed species are known to occur in riparian areas within the lower portion of the Colorado River.

Fish and Wildlife. Table F-1 in Appendix F lists the sensitive invertebrate, amphibian, reptilian, fish, avian, and mammalian species occurring along this portion of the Colorado River. The FWS has designated much of the lower portion of the Colorado River as critical habitat for two federally listed endangered fish species: the razorback sucker and bonytail chub. Reclamation, in conjunction with FWS, USGS Biological Resources Division, National Park Service, Arizona Game and Fish Department, Arizona State University, and the Nevada Division of Wildlife, have formed the Native Fish Work Group, with the specific goal of establishing and maintaining a population of 50,000 adult razorback suckers in Lake Mohave. Reclamation also has formed partnerships with other agencies to protect and enhance native riparian habitats and to create multipurpose wetlands. The following discusses the occurrence of several federally listed threatened and endangered wildlife species that may be affected by the implementation of the proposed action. This discussion is not meant to be exhaustive, but rather to highlight a few high profile species.

The southwestern willow flycatcher (*Empidonax trailli extimus*) is listed as federally endangered. This species occurs along the lower portion of the Colorado River in stands of cottonwood willow and salt cedar and in mixed stands of willow and salt cedar (tamarisk). Sixty-four nesting attempts were documented by McKernan and Braden (1999) in 1998 along the Colorado River. The bald eagle is a federally listed threatened species. The lower portion of the Colorado River is not a major breeding area for this species, but the birds may forage and could occasionally nest in the area. The area may be most important as winter foraging habitat for the species. The yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a candidate for Federal listing. The western yellow-billed cuckoo is found along the lower portion of the Colorado River in mature riparian forests characterized by a canopy and mid-story of cottonwood, willow and salt cedar. The western yellow-billed cuckoo may occur throughout the riparian habitats along the lower portion of the Colorado River. The brown pelican (*Pelecanus occidentalis*) is a federally listed endangered species that may occur occasionally along this portion of the River as a post-breeding wanderer. The brown pelican does not breed along this stretch of the River. The Yuma clapper rail (*Rallus longirostris yumanensis)* is a federally listed endangered species that occurs along the lower portion of the Colorado River primarily in emergent wetland vegetation, such as dense or moderately dense stands of cattails and bulrushes. Based on recent surveys, there are probably over 200 individuals along this part of the River.

The Mojave population of the desert tortoise is federally listed as threatened and occurs within the desert scrub habitat along the lower portion of the Colorado River in California. The razorback sucker is a federally listed fish species that occurs in the lower portion of the Colorado River as well as the mainstem reservoirs of the River. The razorback sucker was reintroduced below Parker Dam, and the backwaters and mainstem of the River are habitat for this species. The lower portion of the River, Lake Mohave, and Lake Mead are considered critical habitat. Bonytail chub is a federally listed endangered fish species found in Lake Mohave and Lake Havasu, but it is not found downstream of Parker Dam. Long-term plans for reestablishment of the bonytail chub in the area downstream of Parker Dam are being formulated. The desert pupfish is a federally listed endangered fish species that once occurred along the Colorado River but no longer occurs between Parker Dam and Imperial Dam.

See Appendix F, Table F-1 for a list of sensitive wildlife species that occur along the lower portion of the Colorado River.

Other Special Status Species

Plants. Six special status plant species were identified in the baseline information for the MSCP (see Appendix F, Table F-2): Algodones Dunes sunflower (*Helianthus niveus* ssp. *Tephrodes)*, foxtail cactus (*Escobaria vivipara* var. *alversonii*), giant Spanish needle (*Palafoxia arida* var. *gigantea*), Grand Canyon evening-primrose (*Camissonia specuicola* ssp. *hesperia*), sand food (*Pholisma sonorae*), and threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*). Of those species, two (the Grand Canyon evening-primrose and threecorner milkvetch) are known to occur in riparian or river wash habitats. However, none of those species is known from riparian areas within the lower portion of the Colorado River.

Wildlife. The following species are listed as threatened or endangered in California. The California black rail (*Laterallus jamaicensis*) is a threatened species that occupies habitat similar to the Yuma clapper rail in this area; the latter is also a State-listed threatened species. The bald eagle, yellow-billed cuckoo, and brown pelican are State-listed endangered species.

Imperial Irrigation District

Vegetation

Naturally occurring vegetation within the IID service area (see Figure 2.2-1 for service area location) consists of seven major biotic community types: creosote bush scrub, wetlands, river riparian, canal/drain riparian, tamarisk-mesquite, saltbush-alkali scrub and agricultural/ruderal plant. The service area consists predominantly of creosote bush scrub, which is dominated by creosote bush and bursage (Barbour and Major 1977). Wetlands and river riparian habitat are found along the New River and Alamo River that flow from Mexico to the Salton Sea, as well as around the perimeter of the Salton Sea. Irrigation canals and drains operated by IID are found throughout the service area. Riparian habitat is associated with the canals and drains. Some seepage from the canals occurs at various locations and, in some areas, supports wetland/riparian vegetation. The tamarisk community is characterized by dense thickets of trees. Saltbush-alkali scrub is a transitional community type that appears when soil salinity and moisture reach concentrations high enough to exclude most other vegetation. The saltbush-scrub community is characterized by allscale, a small shrub. Approximately half of the naturally occurring vegetation in the IID service area has been cleared for agriculture. Many of the small agricultural drainages in the area contain marsh or riparian habitat. Areas that are undisturbed and undeveloped are generally in the less fertile areas, or they occur as small isolated patches. Ruderal vegetation is found throughout the areas cleared for agriculture but not in production (IID 1986).

Fish and Wildlife

Fish and wildlife resources are presented below for the seven major biotic community types identified above. Approximately 50 species of birds, 50 species of mammals, and 40 species of reptiles and amphibians are associated with the creosote bush scrub community type. The most common small mammal present is the Merriam's kangaroo rat (*Dipodomys merriami)*. Larger mammals present include cottontail (*Sylvilagus* spp.*)* and black-tailed jackrabbit (*Lepus californicus*). Striped skunk (*Mephitis mephitis*) and coyote (*Canis latrans)* are also present in the small mesquite thickets scattered throughout the creosote bush scrub. White-crowned sparrow (*Zonotrichia albicollis*) is the most abundant bird species. Other species of birds present include roadrunner (*Geococcyx californianus*) and loggerhead shrike (*Lanius exubitor*) (IID 1986).

The larger wetlands in the IID service area provide important nesting sites for yellow-headed blackbirds (*Xanthocephalus xanthocephalus)* and fulvous whistling ducks (*Dendrocygna bicolor)*. Red-winged blackbirds (*Agelaius phoeniceus)* and black-crowned night herons (*Nycticorax nycticorax)* roost in smaller wetlands. The most common waterfowl species found in the IID service area is cinnamon teal (*Anas cyanoptera);* American coot (*Fulica americana)* and black-necked stilt (*Himantopus mexicanus)* are also common. Frequent mammalian visitors to wetlands within the IID service area are coyote, fox, cottontail rabbit, and raccoon (*Procyon lotor)*. The most abundant small mammals are cotton rat (*Sigmodon hispidus)* and brush mouse (*Peromyscus boylii*), but western harvest mouse (*Reithrodontomys megalotis*), house mouse (*Mus musculus*), and white-throated woodrat (*Neotoma albigula*) are also present. Red-spotted toad (*Bufo punctatus*) and leopard frog are known to occur in wetlands within the IID service area, and the bullfrog (*Rana catesbeiana*) is common (IID 1986).

The New and Alamo Rivers provide some of the last available riparian wildlife habitat in the IID service area. Approximately 110 species of birds, 30 species of mammals, and 20 species of reptiles and amphibians are associated with river riparian habitat. River riparian communities are important to birds as breeding areas, food sources, roosting/loafing areas, and migration corridors. Bird abundance and diversity are higher in this community type than in adjacent desert habitats. Mourning doves (*Zenaida macroura)* are abundant in tamarisk vegetation. Ducks, including large flocks of teal (*Anas* spp.*)*, favor shoreline features as resting sites. Stands of thick arrow weed provide roost sites for many bird species – notably black-crowned night heron. Large mammals are distinctively absent in river riparian communities due to the limited extent of the habitat type in the IID service area and the high level of human activity. Deer mouse (*Peromyscus maniculatus)* and cotton rat are rarely present, as are insectivorous bats, muskrat, (*Ondatra zibethicu)* raccoon, grey fox (*Urocyon cinereoargenteus),* and coyote. Beaver used to be a major component of the mammalian fauna, but it is presently scarce because its preferred food, cottonwood and willow, is no longer abundantly present. Bullfrog, leopard frog, Woodhouse's toad (*Bufo woodhousei)* and spiny softshell turtle (*Trionyx spiniferus)* have historically been found in river riparian habitat (IID 1986).

Wildlife in the canal and drain systems are heavily influenced by the nature of the adjacent community types. There is a high diversity of species attributed to the high degree of community interface. Approximately 90 species of birds and 20 species each of mammals and reptiles/amphibians are associated with the canal and drain systems. Blacktailed jackrabbit, cottontail, and Gambel's quail (*Callipepla gambelii)* are more abundant than in the creosote bush scrub community. The most commonly observed birds in the reeds along the larger canals are black phoebe and western kingbird. Mourning dove and red-winged blackbird are found on levee berms. Other birds use the canal and drain systems seasonally, including coot, ruddy duck, cinnamon teal, blue-winged teal. Rough-winged swallow (*Stelgidopteryx serripennis)* and burrowing owl (*Athene cunicularia)* are found along lateral and secondary drains. Burrowing owl is a Federal Special Concern species, FWS Migratory Nongame Bird of Management Concern, California Special Concern species, and BLM Sensitive species (California Department of Fish and Game [CDFG] 2001). A limited number of mammals are considered true associates of the canal and drain system. Muskrat is the dominant species. Also present are round-tailed ground squirrel, kangaroo rat, southern pocket gopher, and common house mouse. Bullfrog and Woodhouse's toad are the dominant herpetofauna (IID 1986). A variety of fish species occur throughout the lined and unlined canal systems, although the lined sections of the canals are less productive due to lower habitat diversity and higher water velocity. These species include most introduced sport fishes including bass and catfish.

Approximately 40 species of birds, 20 species of mammals, and 10 species of reptiles and amphibians utilize the tamarisk community type. Notable winter and resident bird species of this community type are northern mockingbird (*Mimus polyglottos)*, sage thrasher (*Oreoscoptes montanus)*, western bluebirds, and Gambel's quail. Commonly found breeding birds are Abert's towhee (*Pipilo aberti)*, crissal thrasher (*Toxostoma crissale)*, warbler (*Vermivora luciae)*, mourning dove, and phainopepla (*Phainopepla nitens*). Dominant mammals of the tamarisk-mesquite community type are black-tailed jackrabbit, desert cottontail, striped skunk, coyote, gray fox, pocket mouse, Merriam's kangaroo rat, and white-throated woodrat. Reptiles associated with this community type include sidewinder (*Crotalus cerastes*), desert iguana (*Dipsosaurus dorsalis*), coach whip (*Masticophis flagellum*), and side-blotched lizard (*Uta stansburiana*).

The saltbush-alkali scrub community is characterized by approximately 40 species of birds, 10 species of mammals, and 15 species of reptiles and amphibians. Gambel's quail and mourning dove eat saltbush seeds, and Gambel's quail nest around the shrubs. Impenetrable thickets of scrub are preferred breeding sites for Abert's towhee (*Pipilo aberti*), grosbeak (*Pheucticus* spp.), and several sparrow species. The most abundant mammals are deer mouse, desert pocket mouse (*Perognathus penicillatus*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and southern pocket gopher (*Thomomys bottae)*. Also present are black-tailed jackrabbit and Audubon's cottontail. Of the approximately 15 species of reptiles and amphibians, reptiles are the most abundant compared to other habitat types. These include desert glossy snake (*Arizona elegans eburnata*), coach whip, and western long-nosed snake (*Rhinocheilus lecontei lecontei*) (IID 1986).

The agricultural/ruderal community type is dominated by wildlife species relatively tolerant of or adapted to human disturbance and presence. Birds visit agricultural areas to feed, and then return to more isolated areas. Flocks of ring-billed gulls, red-winged blackbirds, cattle egrets (*Bubulcus ibis*), and common egrets feed on insects from freshly harvested or recently plowed fields. Red-winged blackbirds, English sparrows, pigeons (*Columba* spp.*)*, brown-headed cowbirds (*Molothrus ater*), and starlings (*Sturnus vulgaris*) are often observed in the vicinity of cattle feedlot operations. Waterfowl and game birds that range into agricultural areas to feed on grains and leafy crops are hunted during the fall and winter. These include ducks and geese, and white-winged (*Zenaida asiatica*) and mourning doves. Some mammals and reptiles, such as western harvest mouse and valley pocket gopher, have increased in abundance as a result of lands being converted to agricultural use. These are considered "generalist" species since they survive under a wide variety of environmental conditions. However, the overall density and abundance of reptiles and amphibians throughout the agricultural/ruderal community type (IID 1986) are low.

Federal Special Status Species

Plants. Peirson's milkvetch (*Astragalus magdalenae* var. *peirsonii*), which is found in desert dunes, is the only federally listed plant species known to exist in the IID service area (see Appendix F, Table F-2).

Fish and Wildlife. The following discussion is based on information supplied by IID (1986) and supplemented by Childs (1990) and Lane (1979). Portions of the IID service area contain habitat for federally listed sensitive wildlife species. Finney and Ramer Lakes, which are approximately 10 miles southeast of the south shore of the Salton Sea, provide nesting habitat for the federally endangered Yuma clapper rail. See Appendix F, Table F-1 for a list of sensitive wildlife species that occur in the IID service area.

Other Special Status Species

Plants. Eighteen special status plant species are known to exist in the IID service area (see Appendix F, Table F-2). Most of these species are concentrated in areas of native habitat within sand dunes or blow sand areas. These include the endangered Algodones Dunes sunflower and Peirson's milkvetch, and the rare Wiggin's croton (*Croton wiggensii*).

Fish and Wildlife. Finney and Ramer Lakes also provide habitat for less sensitive but locally important species such as wood stork, double-crested cormorant, and crissal thrasher. Approximately 30,000 egrets, including the great egret nest at Finney Lake. Parks and washes in the Brawley area provide habitat for the Gila woodpecker (*Melanerpes uropygialis*). Fields near the town of Imperial, at the confluence of Harris Road and Highway 111, contain wintering habitat for white-faced ibis (*Plegadis chihi*), ferruginous hawk, and mountain plover (*Charadrius montanus*). Other agricultural areas of Imperial County attract gull-billed tern (*Sterna nilotica*), black tern (*Chlidonias niger*), bald eagle, ferruginous hawk, northern harrier, long-billed curlew (*Numenius americanus)*, and loggerhead shrike. Marshes and flooded agricultural fields provide habitat for Aleutian Canada geese (*Branta canadensis*), wood stork (*Mycteria americana*), white-faced ibis, California black rail, long-billed curlew, and other sensitive species. The density of burrowing owls in Imperial County is the highest for any county in California, with a population of approximately 1,500 birds. Double-crested cormorants (*Phalacrocorax auritus*) may also be found along the New and Alamo Rivers, as can sharp-shinned hawks, Cooper's hawks, and Yuma clapper rails. Areas near the unlined portions of the AAC support Yuma clapper rail and California black rail. Sandy areas support Colorado fringe-toed lizard (*Uma notata notata*).

Sixty-four special status species of wildlife are known to have occurred within the IID service area, including three species of reptiles, two species of amphibians, 47 birds, and 12 mammals (see Appendix F, Table F-1).

Coachella Valley Water District

Vegetation

Natural vegetation in the CVWD service area consists predominantly of creosote bush scrub (Barbour and Major 1977). Other natural plant communities are generally scattered and limited in extent. They include palm oasis, saltbush scrub, alkali sink, dunes and blow-sand, and wash woodland. Palm oases can be found where there are natural springs. Many naturally occurring palm oases have been developed and planted with non-native species. Saltbush scrub is as described above for the Colorado River area. Alkali sink occurs in low-lying areas that tend to retain water for periods of time and do not have an outlet for water to drain. Such areas generally have heavier soils and have accumulated salts. A distinctive desert wash woodland community occurs on deep, sandy soils in canyons, on alluvial fans, and along normally dry stream courses (arroyos) throughout the Colorado Desert, including the Coachella Valley. The vegetation is open woodland characterized by drought deciduous shrubs and trees whose deep roots enable them to reach the water that percolates seasonally through sandy soils along drainages. Typically dominant species include catclaw (*Acacia greggii*), palo verde (*Cercidium floridum*), desert willow (*Chilopsis linearis*), smoke tree (*Dalea spinosa*), desert lavender (*Hyptis emoryi*), ironwood (*Olneya tesota*), and mesquite (*Prosopis juliflora*). The wetter and more poorly drained areas are likely to support invasive tamarisk (*Tamarix* spp.) as well.

Approximately one-tenth of the CVWD service area has been developed for agriculture. Urban development in the area that would be most directly affected by the IA is concentrated in the various communities within the service areas.

Habitat value (and wildlife use) is higher where the community composition includes more native species and less salt cedar. The BLM and The Nature Conservancy have worked to remove salt cedar from springs in the Dos Palmas Area of Critical Environmental Concern (ACEC) (USBR and CVWD 2001).

Fish and Wildlife

The overall CVWD service area contains a high variety of wildlife typical of desert habitats. This area includes creosote scrub, saltbush scrub, mesquite hummocks and small desert riparian areas.

Riparian and marsh plant communities supported by canal seeps are important wildlife habitats, especially in the Dos Palmas ACEC (USBR and CVWD 2001). They are located on the east side of the Salton Sea. These seepage wetlands support at least 170 species of birds, 27 species of mammals, and five species of reptiles and amphibians (DOI 1993). They are of particular importance to the federally listed endangered and State-listed threatened Yuma clapper rail, as well as the State-listed threatened California black rail, both of which breed in these seep-fed marshes. The federally listed and State-listed endangered desert pupfish is reported to exist in the Dos Palmas ACEC (USBR and CVWD 2001). Agricultural and native desert areas support many of the same species discussed under the IID section, above.

The lined and unlined portions of the Coachella Canal contain sport fish, such as large mouth bass and catfish.

Federal Special Status Species

Plants. Two federally listed species are known to occur within the CVWD service area—the Coachella Valley milkvetch (*Astragalus lentiginosus* var. *coachellae*) and the triple-ribbed milkvetch (*Astragalus tricarinatus*) both of which occur primarily in the Whitewater and Morongo Valleys.

Fish and Wildlife. According to the Coachella Canal Lining Project EIS/EIR (USBR and CVWD 2001):

> The federally endangered Yuma clapper rail uses the wetlands [associated with canal seepage]. One candidate species, the Palm Springs ground squirrel (*Spermophilus tereticaudis chlorus*) is the only candidate species in the area. In addition, 36 species of birds, which have been designated rare or endangered by DFG or species of concern by the National Audubon Society, commonly occur in such wetlands.

Other habitats in the service area support additional sensitive species. The Coachella Valley Preserve contains habitat for the threatened Coachella Valley fringe-toed lizard (*Uma inorata*). At the northern tip of the district is Whitewater Canyon, where federally endangered Least Bell's vireos (*Vireo bellii pusillus*) may be found. Peninsular bighorn sheep occur in the mountains near some parts of the Valley, such as near Rancho Mirage and La Quinta, where they occasionally come down to feed or drink. The general study area may also contain some desert tortoises. The upper Whitewater River is also historic habitat for the arroyo southwestern toad (*Bufo microscaphus californicus*). See Appendix F, Table F-1 for a list of sensitive wildlife species that occur in the CVWD service area.

Other Special Status Species

Plants. Twenty-four rare, threatened, or endangered plant species are known to exist in the CVWD service area. See Appendix F, Table F-2 for a listing of sensitive plant species that occur in CVWD service area (California Natural Diversity Data Base).

Fish and Wildlife. Forty-eight special status species are known to have occurred within the CVWD service area. These include four amphibians, most notably the desert slender salamander (*Batrachoseps aridus*), a State-listed endangered species. Also included are the State-listed endangered desert pupfish, four reptile species, and approximately 39 species of birds. See Appendix F, Table F-1 for a complete list of special status species that occur in the CVWD service area.

Metropolitan Water District

The MWD service area consists of primarily urban areas. These areas have been developed and little natural habitat remains. There are, however, large areas containing valuable biological resources ranging from coastal marshes, riparian systems, and oak woodlands to coastal sage scrub. The area supports over 35 listed plant and animal species as well as a number of habitats considered sensitive by the CDFG and various local agencies such as the County of Los Angeles.

San Diego County Water Authority

The SDCWA service area is similar in most characteristics to the MWD service area, discussed above. The SDCWA service area does contain substantial amounts of agricultural land in the northeast part of the service area, and a large military base in the northwest part of the service area. Included in the SDCWA service area are habitats covered by pending and approved broad-based, multi-species habitat conservation plans.

Salton Sea

The following baseline information is summarized from the Salton Sea Restoration Project EIS/EIR (USBR and SSA 2000) and from other relevant literature and reports.

Vegetation

Terrestrial vegetation in the Salton Sea area generally can be grouped into seven categories: marshes, unvegetated areas (including open water and mudflats), alkali playa, riparian areas (either as wash or woodland communities), desert scrub and chaparral, grassland, and developed areas (including urban and agriculture). Marsh areas can be freshwater, generally dominated by common reed (*Phragmites australis*), cattail (*Typha* sp.), golden dock (*Rumex maritimus*), and rabbits foot grass (*Polypogon monspeliensis*); or alkaline species such as salt grass (*Distichlis spicata*), alkali bulrush (*Scirpus robustus*), and spreading alkali grass (*Cressa truxillensis*). They generally occur on the deltas of the New and Alamo Rivers, Coachella Valley Stormwater Channel, and the outlets of small irrigation drains and the mouths of Salt Creek and San Felipe Creek. They also occur around the margin of Imperial Waterfowl Management Area, Sonny Bono Salton Sea National Wildlife Refuge, and private hunting clubs. Other areas contain marshes, including along unlined drainage canals. Open water habitats are always inundated. Mudflats are typically exposed for a period of time and inundated for periods of time. Neither open water nor mudflats have any appreciable terrestrial vegetation.

There are substantial areas of riparian vegetation containing salt cedar and other non-native species. Dry wash woodlands are typically found along sandy or gravely washes of the desert areas. Drought deciduous woodlands are typically dense.

The desert scrub community is found in relatively undisturbed upland areas in the vicinity of the Salton Sea. Cover and species vary with environmental conditions including slope, aspect, and water capacity of the soils. Areas that are well drained and on exposed slopes contain widely spaced shrubby species with dense grasses and herbs in the understory. Areas that are low and flat will contain a dense scrub community, such as creosote bush scrub. Non-native grassland areas are typically found in areas that have been disturbed in the past. Generally, grasslands are sparse in vegetative cover.

Urban and agricultural areas are developed for human use and little to no native vegetation is present. However, various types of landscaping are planted in urban areas and around agricultural areas.

Fish and Wildlife

The Salton Sea is characterized by high algal productivity, which also sustains high secondary levels of zooplankton and benthic worms. This favors fish that tolerate high temperatures, high salinity, and low concentrations of dissolved oxygen. Fish were first introduced into the Salton Sea in the early 1950s for aquaculture, mosquito control, and recreational fisheries. Fish now occur in the canals, irrigation ditches, rivers, and the Sea itself. However, the channelized canals are less productive fish habitats than the unchannelized rivers due to lower habitat diversity and higher water velocity (CVWD and IID 1985). The Salton Sea currently supports numerous species of fish including sailfin molly (*Peocilia latipinna*), porthole livebearer (*Poecliopsis gracilis*), longjaw mudsucker (*Gillichthys mirabilis*), tilapia (*Oreochromis mossambicus and Tilapia zillii*), sargo (*Anisotremlus davidsonii*), bairdiella (*Bairdiella icistia*) and orange mouth corvina (*Cynscion xanthulus*) (USBR and SSA 2000).

Since the Salton Sea has no outlet, the high evaporation rates in the area have resulted in increasing salinity of the Sea. Reclamation (USBR and SSA 2000) in the recent Salton Sea Restoration Project EIS/EIR has theorized that the Sea will eventually reach salinity levels that will result in the loss of fish species. The gradual increase in salinity is expected to result in a gradual loss of food sources, reduction of reproductive capacity, and eventual decline in species, even with the current inflows to the Sea. The timing of the eventual elimination of the Salton Sea fisheries is uncertain because it involves a number of external environmental factors, as well as the adaptation potential of the fish.

Over 400 species of birds have been recorded at the Salton Sea. Millions of birds utilize the Salton Sea each year. The 1999 census by Point Reyes Bird Observatory (PRBO) found that eared grebes number 47,000 in the spring and over 320,000 in the winter at the Sea, while populations of black-necked stilts, American avocets (*Recurvirostra americana*), and ring-billed gulls (*Larus delawarensis*) each numbered in the hundreds of thousands. The Salton Sea faces threats to its biological health due to increasing levels of salinity and toxic chemicals, eutrophication, and changing water levels. An effort is underway to reduce and stabilize the overall salinity of the Salton Sea and stabilize its surface elevation. However, no final commitment has been made and no Federal funds have been allocated for implementation of a restoration program. An EIS/EIR for the Salton Sea Restoration Project has been released in draft form, but the alternatives considered are now under revision, and additional alternatives are being formulated. Extensive funding for research at the Sea is ongoing.

Federal Special Status Species

Plants. Two federally listed plants species are found in the general vicinity of the Salton Sea—the endangered Coachella Valley milkvetch (*Astragalus lentiginosus* var. *coachellae*) and the threatened Peirson's milkvetch. Neither of the species is apparently adapted to conditions at the shore of the Salton Sea, as indicated in Appendix F, Table F-2.

Fish and Wildlife. The endangered desert pupfish still exists at various locations in and around the Salton Sea, but in relatively low numbers that are probably greatly reduced from historic times. The introduced exotic fish species have adversely affected the once abundant pupfish through competition, predation, and behavioral interference. The limited populations around the Salton Sea appear to be occupying habitat marginally suited for pupfish. The agricultural drains at their interface with the Salton Sea support the largest numbers of pupfish within the Salton Sea system. Desert pupfish may also occur in the shallow nearshore areas of the Sea.

Of the over 400 species of birds that have been recorded at the Salton Sea, 58 are considered sensitive species. Thirty-two of these sensitive bird species nest at the Sea, of which four are Federal special status species. In many cases a substantial proportion of the population of a species may be found at the Sea. The Yuma clapper rail is an endangered species that occurs in the marsh areas around the Sea and near the irrigation drains. Over 200 individuals were noted in 1999 around the Salton Sea with the major concentrations at the Wister Unit of the Imperial Wildlife Area and the Salton Sea National Wildlife Refuge. Smaller populations were recorded at Barnacle Beach and at the Holtville drain. On average, about 365 Yuma clapper rails are counted each year, which is 25 to 40 percent of the entire U.S. population. The Salton Sea in recent years has supported nesting for the endangered brown pelican. The Sea also serves as a foraging area for some individuals. Over 5,000 brown pelicans have been found here, and some breeding of brown pelicans has occurred at the Sea in the last few years.

Other Federal special status species that also occur around the Salton Sea include five species of invertebrates, three species of amphibians, two species of reptiles, and approximately 17 species of mammals. A complete list of sensitive species can be found in Appendix F.

Other Special Status Species

Plants. Fifteen plant species known to occur within the Salton Sea general area are State or California Native Plant Society listed (see Appendix F, Table F-2).

Fish and Wildlife. The California black rail occurs around the Salton Sea in habitat similar to the Yuma clapper rail. February 1999 PRBO surveys found 2,486 snowy plovers (*Charadrius alexandrinus nivosus*) in the Salton Sea basin, representing about half of the California population. The Sea serves as important nesting areas for the snowy plover and is considered one of the best inland nesting areas for this population. Although Pacific Coast populations of snowy plover are a federally listed threatened species, the inland population at the Salton Sea is not federally listed. Inland populations of the snowy plover are, however, a California Species of Special Concern. In addition, as many as 33,000 American white pelicans (*Pelecanus erythrohynchos*) may also winter here. It is estimated by the FWS that 80-90 percent of the entire population stops at the Sea in the winter. The Salton Sea hosts the second largest wintering population of white-faced ibis in California, with over 24,000 counted in the 1999 PRBO census. The Salton Sea also is an important nesting area in California for the gull-billed tern.

Other non-Federal, special status species that also occur around the Salton Sea include one species of amphibian, six species of reptiles, and approximately four species of mammals. A complete list of sensitive species can be found in Appendix F.

3.2.2 Environmental Consequences

Impact Assessment Methodology

The impacts of the proposed action and alternatives were compared against the No-Action Alternative to identify whether adverse impacts would occur. In addition, the results of the

Biological Opinion for Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary, Arizona, California, and Nevada, prepared by the FWS (2001) (Appendix E) were used to identify biological impacts and mitigation measures.

No-Action Alternative

No Action for Implementation Agreement

Under the No-Action Alternative, California's use of Colorado River water would be limited to 4.4 MAF in normal years, subject to the benchmarks and other provisions included in the ISG ROD. In a normal year, River flows, and therefore water levels, from Hoover Dam to Imperial Dam would likely be less than historic conditions, since surplus and unused apportionment waters (historically delivered as Priority 5a, 5b, 6a, and 6b water) may not be available. This change would be small and occur gradually over a number or years. Any changes that might occur would be consistent with what is allowed under the current legal framework of the Law of the River.

Potential impacts to the Salton Sea and habitat within the Imperial Valley due to the implementation of the IA would not occur. It should be noted that even without the reduction of flows to the Salton Sea, the Sea would increase in salinity and would eventually no longer be able to support the aquatic organisms necessary to support the numbers and diversity of the waterfowl and shorebirds occurring at the Salton Sea.

There is a likelihood that some of the facilities considered in this EIS may still be constructed in the CVWD service area to accommodate other elements of the CVWMP not directly related to the IA. This could result in biological impacts that are similar to the proposed IA. There also is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA. No changes to the MWD and SDCWA service areas would occur that would be expected to adversely impact biological resources.

No Action for Inadvertent Overrun and Payback Policy

This alternative would continue the current method of operating the reservoirs along the lower portion of the Colorado River. This would result in the same quantity of flood flows as occurs at present. This would not impact biological resources.

No Action for Biological Conservation Measures

No changes to biological resources would occur since the biological conservation measures would not be implemented. Reconsultation with FWS would be required to effectuate any newly proposed actions.

Proposed Action

Implementation Agreement

COLORADO RIVER

The IA would not impact river flows between Hoover Dam and Parker Dam. However, the IA would reduce river flows in the Parker Dam to Imperial Dam reach by 183 to 388 KAFY. Therefore, under the most conservative assumptions, the flow between Parker Dam and Imperial Dam could be reduced by 388 KAF (see further discussion in section 3.1 of this document). In association with the preparation of the BA for the ISG, IA, and California Water Plan Components and Conservation Measures, Reclamation (2000a) modeled potential impacts to open water, marsh habitat, and riparian habitat as a result of the potential decreases in flows. Reclamation used the Muskingum routing technique, HEC-RAS water surface profile modeling software, and a GIS vegetation database to model potential impacts (see Appendix D). Reclamation modeled a range of reductions in annual flow from 200 KAFY to 1,574 KAFY, where the upper end of the range is a theoretical maximum cumulative change in flow that could occur in the future. For reductions similar to the IA (400 KAF), the analysis showed that the overall changes in river flows would be small (approximately 0.4 feet). Further explanation of the methodology used to analyze the effects on water surface elevation can be found in Appendix J.

A BO for the IA was issued by the FWS on January 12, 2001. Based on the assumed 400 KAFY reduction of flow within the Colorado River from Parker Dam to Imperial Dam (a conservative assumption since it is expected that the reduction in flow would not exceed 388 KAFY), the BO estimated that there could be a loss of 35 acres of main channel open water habitat (used by fish), 44 acres of backwater and marsh habitat (about 17 acres and 28 acres, respectively [these acreages total 45 rather than 44 due to rounding]), and up to 372 acres of riparian habitat used by southwestern willow flycatchers plus 5,404 acres of riparian habitat that is currently unsuitable for use by flycatchers, but which could potentially be improved and used by flycatchers in the future. The BO determined that the biological conservation measures that are included as part of the proposed action considered in this EIS would reduce these impacts to acceptable levels.

Vegetation. Groundwater levels are predicted to drop 0.4 feet or less (FWS 2001), which has the potential to impact riparian vegetation with shallow roots along the outward fringes of the riparian zone. Deeply rooted plants would not be impacted. However, only eight percent of the total riparian vegetation is relatively undisturbed native riparian woodland. Cottonwood and willow trees as well as marsh vegetation are more susceptible to lowering of groundwater levels than are other riparian plants such as mesquite, salt cedar, and arrow weed (USBR 2000a). The biological conservation measures incorporated as part of the proposed action, and discussed below, would compensate for this impact.

Fish and Wildlife. Implementation of the IA would result in lower river flows between Parker Dam and Imperial Dam. These flows would be within the range of normal fluctuations. Some sport fish are generalists and will be able to take advantage of the altered habitat conditions presented by a managed water system. Therefore, adverse impacts to sport fisheries are anticipated to be negligible. As discussed above, implementation of the IA has the potential to reduce wetland and riparian habitat along the Colorado River that is used by amphibians, reptiles, riparian and marsh obligate birds, and mammals. The biological conservation measures incorporated as part of the proposed action would compensate for this impact.

Sensitive Species. Discussions of impacts to sensitive species of plants and fish and wildlife follow.

Plants. The IA would not impact any sensitive plant species because no such species are known to be located within the potential area of impact (i.e., along the margins of and within wetlands associated with the River).

Fish and Wildlife. As discussed above, Reclamation (2000a) and the FWS (FWS 2001) anticipate a potential loss of about 17 acres of backwater and 28 acres of marsh habitat within backwaters due to implementation of the IA. Loss of backwater areas (17 acres) could adversely impact razorback suckers that use these habitats for rearing and foraging. Loss of approximately 35 acres of main channel habitat could potentially reduce habitat for the razorback sucker (FWS 2001) and the bonytail chub if this latter species is reintroduced into the project area. Loss or degradation of habitat for listed fish species would be an adverse impact that would need to be mitigated through the biological conservation measures incorporated as part of the proposed action. Since no desert pupfish are present in the area, no impact to this species would occur.

No impact to the desert tortoise would occur, since the desert habitat occupied by this species would not be impacted by the IA. No adverse impacts to the southern bald eagle or brown pelican would occur since they are only occasional visitors to the area and no substantial reduction to their foraging habitat would result from the IA. The projected reduction in emergent vegetation (about 28 acres) may result in the reduction of habitat for the Yuma clapper rail and the California black rail due to loss of breeding and feeding habitats. This loss of habitat would be compensated for by the habitat restoration included as part of the proposed action.

There is a potential, but less defined, impact to riparian vegetation along the lower portion of the Colorado River due to decreased river flows and the resultant decline in water levels (surface and ground) that would lower water in the root zone of riparian species. This impact would be gradual, and some of the riparian vegetation may be redistributed as groundwater levels changed. In the worst case, there may be an adverse impact to riparian vegetation that is habitat for the southwestern willow flycatcher and the yellow-billed cuckoo. Since the potential impact to occupied habitat could not be determined with certainty at this time, the BO provided a conservation measure that would require monitoring of 237 acres of habitat occupied by the southwestern willow flycatcher. Measures would be implemented to provide additional habitat if the monitoring program indicates degradation of this riparian habitat. In its BO for the IA, FWS (2001) identified a number of measures to mitigate the impacts to the Yuma clapper rail and razorback sucker, and these are incorporated as part of the proposed action. Although the measures were directed toward federally listed wildlife species, it is also anticipated that these measures would mitigate for loss of habitat for the State-listed black rail and yellow-billed cuckoo. These measures would also compensate for any loss of riparian or marsh habitat.

The IA would not result in any impact to terrestrial habitats other than the riparian zones since no construction or other physical changes would occur. Therefore no impact to terrestrial mammals, reptiles, or raptors would occur.

IMPERIAL IRRIGATION DISTRICT

Vegetation. With implementation of the IA and QSA, IID would undertake construction activities associated with conservation measures in the IID service area. These construction activities would have the potential the cause both temporary and permanent losses of native vegetation, depending on the exact location and extent of such activities. The level of impact would be determined by the amount and type of vegetation impacted, as well as the restoration (revegetation) to follow the work. If fallowing is chosen as the sole water conservation method and if additional fallowing is implemented to compensate for reduced inflows, impacts to native vegetation as a result of water conservation activities would not occur. Conservation measures could also result in a reduction of drain water flow and possible water quality changes, in drain water. These changes could impact emergent marsh and riparian vegetation along the drains. A detailed analysis of IID's alternatives for water conservation, and their impacts on native vegetation and drain habitats is included in the IID Water Conservation and Transfer Project EIR/EIS.

Fish and Wildlife. Any loss of marsh and riparian habitat resulting from reduced flow in the IID drains could adversely impact bird and amphibian species using that habitat. Loss of native vegetation from construction activities, while not expected to be substantial, could impact common and typical wildlife species using those habitats.

Sensitive Species. An HCP has been prepared for the IID Water Conservation and Transfer Project. The FWS is a cooperating agency in the project EIR/EIS based on proposed Federal actions of approving the HCP and issuing an incidental take permit. The HCP addresses both plant and fish and wildlife species within the IID service area and the Salton Sea. Construction of conservation projects, potential reduced flow and changed water quality in the drains, possible impacts on the Salton Sea, and the potential for fallowing as a conservation method are all addressed in the HCP. The detailed analysis of conservation alternatives, and their impacts on sensitive species, can be found in the IID Water Conservation and Transfer Project EIR/EIS. The HCP is an appendix to the EIR/EIS.

COACHELLA VALLEY WATER DISTRICT

Potential physical impacts associated with the implementation of the QSA water transfers within the CVWD service area are described below. Additional water provided to the CVWD service area would reduce the current groundwater overdraft conditions. It is anticipated that the use of Colorado River water and conserved water would not result in modification of existing farmland or conversion of additional natural areas to farmland since this water is expected to replace current overdrafted groundwater supplies.

Vegetation. It is expected that the alleviation of overdrafted groundwater conditions in CVWD would result in the eventual rise in groundwater levels, which would increase the levels of CVWD drain water flowing into the Salton Sea. This is expected to maintain current riparian and marsh vegetation in the drains even if water conservation measures are implemented. Construction activities associated with installation of recharge basins, pipelines, and pump stations that are part of the CVWMP have the potential to cause both temporary and permanent impacts to native vegetation. Based on a review of the potential facilities associated with the

CVWMP, it is estimated that the facilities required may result in the loss or disturbance of approximately 250 to 500 acres in total. Much of the area where pipelines may be placed has been previously disturbed from agriculture and other activities such as road construction; however, it is anticipated that some areas of desert scrub and desert wash habitat could be impacted by the construction of other facilities. Therefore site-specific studies and mitigation measures would be developed when specific projects are developed.

Fish and Wildlife. Constructing groundwater recharge facilities may impact wildlife habitat. It is anticipated that these facilities would be located primarily in disturbed areas such as roadways or adjacent to existing facilities. No substantive impacts to wildlife are expected, but site-specific surveys may be required when specific sites and project design are provided. Riparian and marsh vegetation may increase due to increased groundwater levels, which would be a beneficial impact.

Sensitive Species. CVWD is participating in a multi-agency, multi-species habitat conservation plan with others in the Coachella Valley (the Coachella Valley Multiple Species Habitat Conservation Plan [CVMSHCP]). Potential impacts to sensitive species from CVWD's delivery and use of QSA water, as well as ongoing activities, such as drain maintenance, will be addressed in the CVMSHCP. In addition, Reclamation will undertake specific section 7 consultations for any facilities, such as recharge basins, that are sited on Reclamation lands. Specific designs and final locations for recharge basins and additional delivery facilities are not yet available. Increased flow in drains is not expected for 10-15 years, based on the build-up schedule for QSA water deliveries and time lag in recharging the aquifer. However, based on available information, the following is a discussion of the potential impacts to sensitive species of plants and fish and wildlife.

<u>Plants</u>. Construction of facilities for groundwater recharge, and expansion of the existing water distribution system are unlikely to impact sensitive plant species since most activities would be in previously disturbed areas. Any construction of groundwater recharge facilities and expansion of the distribution system would be subject to further NEPA compliance when Federal land is impacted or Federal approval is required (see section 2.2.1.3). Any native plant community areas that could contain sensitive species would be evaluated for such species prior to the work and any avoidance or mitigation measures necessary would be implemented as part of those specific projects.

<u>Fish and Wildlife</u>. The Yuma clapper rail and California black rail are not expected to be impacted by changes in the marsh habitat in or near agricultural drains since the drain levels are expected to increase because of increased groundwater levels in CVWD. Additionally, it is not anticipated that there would be any impact to desert pupfish that may reside in the canal.

Construction of groundwater recharge basins and expansion of the distribution system within the CVWD service area are not expected to have any adverse impacts on the American peregrine falcon, Swainson's hawk (*Buteo swainsoni*), or mountain plover because activities associated with these measures are not likely to occur in habitat for these species. It is likely, however, that the Dike 4 recharge facility would encroach into the recently established critical habitat for the peninsular bighorn sheep (*Ovis canadensis*).

METROPOLITAN WATER DISTRICT

Implementation of the IA (which includes water deliveries to Escondido, the Vista Irrigation District, and the San Luis Rey Indian Water Rights Settlement Parties) would not result in any physical changes within the MWD service area including Escondido and the Vista Irrigation District. No construction would occur in the MWD service area, nor would any modifications to the MWD Colorado River water conveyance facilities be required. Therefore, there would be no direct impact to biological resources. Implementation of the IA would not alter any general plans or other planning activities implemented by those local and regional agencies planning land use in the MWD service area. Although continued planned growth within the service area may impact biological resources, this would occur whether or not the IA was implemented. As noted earlier, the transferred water does not represent a "new" water supply to the MWD service area, but rather maintenance of existing supplies. Therefore, no adverse biological impact in the MWD service area is expected from implementation of the IA.

SAN DIEGO COUNTY WATER AUTHORITY

As discussed above under MWD, there would be no physical/construction impacts associated with the implementation of the IA within the SDCWA service area. Additionally, the increased reliability of a portion of the water supply as a result of the implementation of the IA is not expected to have an impact on current planning within the SDCWA service area. Although continued planned growth within the service area may impact biological resources, this would occur whether or not the IA was implemented. Therefore, no adverse impact associated with the implementation of the IA is anticipated.

SALTON SEA

With implementation of the IA and QSA, IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change to a substantial reduction. Under most scenarios, the Salton Sea would shrink at a faster rate than under No Action, the water surface elevation would decline faster, and salinity would increase more quickly. The following briefly describes the potential impacts. The detailed analysis of the impacts and potential mitigation measures for the range of conservation alternatives can be found in the IID Water Conservation and Transfer Project EIR/EIS.

Vegetation. The potential for a more rapidly declining Sea level has the potential to result in the loss of marsh and riparian vegetation, especially in the southern portion of the Sea. The declining Sea level could impact wetland and riparian vegetation along the IID drains, rivers and streams entering the Sea, as well as the confluence of the fresh waters with the Sea.

Fish and Wildlife. An acceleration of the increase in Sea salinity would result in an earlier decline of the sport fisheries and non-game fish of the Salton Sea than would occur under No Action. Under the maximum impact scenario (300 KAFY of conservation with all water transferred out of the valley), the Sea would reach salinity levels of 60,000 mg/l (the point at which fish are not expected to survive) about 11 years sooner than under No Action. It is likely that fish may become concentrated in those areas where freshwater inflows would continue.

The more rapid increase in salinity levels and loss of fish would reduce food sources for fish-eating bird populations sooner than without the project, and thus fish-eating bird populations would decline sooner. Some food fish would likely remain in the portions of the Salton Sea where substantial freshwater inflows remain and continue to provide some forage for birds. Birds that use only the Sea surface for resting and forage in upland areas would not be impacted.

Sensitive Species. IID prepared an HCP in association with the IID Water Conservation and Transfer Project EIR/EIS. The HCP addresses potential impacts both within the IID service area and the Salton Sea. Within the Salton Sea, some of the more notable species of concern include the desert pupfish, Yuma clapper rail, and brown and white pelicans. The desert pupfish could be impacted by the more rapid reduction in water surface elevation of the Sea and potential isolation of drain habitats. Similarly, the Yuma clapper rail and California black rail could be impacted by the loss or decline in productivity of the marshes near the Salton Sea. Fish eating birds, such as the brown white pelicans, would be impacted sooner, since the fish that are food sources for these species would decline sooner. As noted above, this temporal impact could be about 11 years. The detailed analysis of the temporal impacts to these and other sensitive species, as well as proposed mitigation measures, are described in the HCP and the EIR/EIS for the IID Water Conservation and Transfer Project.

Adoption of Inadvertent Overrun and Payback Policy

VEGETATION

Adoption of the IOP is not expected to result in any long-term changes in reservoir levels or in flows in the Colorado River. This policy may result in higher flows in some years and lower flows in others. In balance, the overall flows in the River and reservoir levels are not expected to substantially change from the present conditions. Any yearly changes would be within the historic hydrologic parameters of the river. Therefore, there is not expected to be any substantive impact to riparian and aquatic vegetation.

FISH AND WILDLIFE

The IOP is not expected to result in adverse impacts to fish and wildlife species. There could be slight changes in reservoir levels on a year-to-year basis as well as slight changes in River levels. However, temporary changes due to the IOP would be well within historic fluctuations.

SENSITIVE SPECIES

Implementation of the IOP would result in year-to-year changes in reservoir levels and River levels that would be within the range of historic hydrological conditions. It is expected that these changes would not result in changes to aquatic or riparian habitats. Therefore, impact to the southwestern willow flycatcher, Yuma clapper rail, black rail, and yellow-billed cuckoo are not expected. Variation in reservoir levels and River levels would be within the normal levels of the River, and impacts to the razorback sucker and bonytail chub are not expected.

Implementation of Biological Conservation Measures

Implementation of the biological conservation measures identified in the BO for the proposed action, while increasing habitat for the listed species, may also result in at least temporary impacts to vegetation, fish, and wildlife species through physical activities such as dredging, removal of salt cedar by mechanical or other means, and conversion of agricultural lands to native habitat. These impacts are addressed at a general level since specific areas where these conservation measures would occur have not been identified. Site-specific studies would be conducted as needed and mitigation measures identified prior to the actual implementation of the conservation measures.

VEGETATION

Implementing the biological conservation measures may have short-term impacts to native and non-native vegetation. Dredging areas to create or enlarge backwater marsh habitat may have the potential to disrupt existing marsh vegetation during the construction phase. This impact is considered minimal since the disruption would be temporary, and it is anticipated that additional, better quality vegetation would be established once restoration is completed.

There is also a potential that salt cedar and some native vegetation such as willow or mesquite may be removed in order to develop cottonwood willow habitat. It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed on an incidental basis. Therefore, the impact is considered to be minor.

FISH AND WILDLIFE

Implementation of the conservation measures may create short-term impacts on fish and wildlife species during the period of restoration. This may be due to physical loss associated with vegetation removal or dredging. Additionally, sedimentation during dredging may also impact aquatic organisms. This impact would be short term and less than significant. Removal of vegetation during the nesting season may result in substantive impacts to nesting bird species, but this impact is readily avoidable by scheduling construction to avoid the nesting season.

SENSITIVE SPECIES

Since the objective of the conservation measures is to enhance the habitat for sensitive fish and wildlife species, a long-term beneficial impact to sensitive fish and wildlife species is anticipated. There is a potential that short-term impacts to some sensitive species could occur during the restoration activities. These impacts could include sedimentation impacts within backwaters inhabited by the razorback sucker and by disturbance of marsh habitat occupied by the Yuma clapper rail. There is also a potential the southwestern willow flycatcher could be impacted during the removal of salt cedar habitat, which is non-native habitat. Depending upon the location and timing of restoration activities, this could cause a substantial impact to these species.

Mitigation Measures

IMPLEMENTATION AGREEMENT

Colorado River. Mitigation/conservation measures were provided in the BO (FWS 2001) for the Secretarial Implementation Agreements to address any impact to the razorback sucker, southwestern willow flycatcher, and Yuma clapper rail and are incorporated in this EIS as part of the proposed action (see section 2.2.3 and Appendix E). These measures are based on diversions resulting in a reduction in flow of 400 KAFY between Parker and Imperial Dams; the actual impacted acreage would be proportionally reduced if the diversions upstream of Parker Dam are less than 400 KAFY, as expected. It should also be noted that these measures would mitigate for actual loss of marsh and riparian habitat as well as for potential impacts to the yellow-billed cuckoo and black rails.

Impacts to nesting birds from construction of the biological conservation measures would be readily avoidable by scheduling construction to occur outside of the nesting season.

Imperial Irrigation District. IID developed measures to mitigate any potential impacts to wetlands associated with the drains that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. IID would implement an HCP to minimize and mitigate the impacts. Non-Salton Sea components of the HCP that are intended to mitigate the impacts of any take of covered species that might occur as a result of the activities covered by the HCP, including the proposed action, within the IID service area include the following:

- Tamarisk Scrub-Habitat Conservation Strategy: Replacement of habitat disturbed through planting of mesquite bosques and/or cottonwood willow habitat. Additional habitat replacement where subsurface drainage is affected by canal construction or other activities.
- Drain Habitat Conservation Strategy: IID would create at least 190 acres of managed marsh habitat to a maximum of 652 acres.
- Desert Habitat Conservation Strategy: This strategy involves an extensive monitoring program and habitat replacement associated with construction of canals and other facilities within desert habitat.
- Burrowing Owl Conservation Strategy: This strategy would involve pre-construction monitoring; avoidance, where possible, of nesting and foraging areas; and other methods, such as nest boxes, to mitigate any impact to the species.
- Desert Pupfish Conservation Strategy: IID would manage its drains to minimize water quality impacts to the species and develop measures to enhance habitat within the drains. IID would also minimize impacts during maintenance of the drains to reduce any impact to the species.
- Razorback Sucker Conservation Strategy: Any fish found within the canals would be transported back to the Colorado River.

Coachella Valley Water District. Potential impacts would be mitigated either through avoidance of the resource or through site-specific mitigation, including such measures as habitat restoration. These mitigation measures are being developed as part of the PEIR for the CVWMP and the CVMSHCP.

Salton Sea. As discussed above, an HCP has been prepared by IID to address the impacts on sensitive species involved with components of the IA and QSA. Through this process, specific mitigation measures, including the Salton Sea Conservation Strategy, have been developed.

IID developed the Salton Sea Conservation Strategy to mitigate impacts on the salinity of the Salton Sea that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. With implementation of the Salton Sea Conservation Strategy, IID would discharge water to the Sea for the purpose of avoiding or minimizing effects on fish and fish-eating birds. The amount of water used to mitigate effects on salinity and the number of years over which that water would be discharged to the Sea would be based on the projection of when salinity in the Sea would reach a level at which tilapia can no longer reproduce. By maintaining suitable salinity conditions in the Sea, IID would ensure continued persistence of fish (and therefore fish-eating birds) for a period consistent with that projected under the No Action. Under this approach, fish-eating birds would be represented at the Salton Sea for the same period of time with or without the proposed action. This approach would also result in a deceleration in the rate of salinization in the Sea. This improvement over No Action conditions likely would provide indirect benefits to salt-sensitive species, including several of the sport fish species that are the basis for the recreational sport fishery.

Avoiding salinity impacts would also result in the avoidance of biological impacts associated with changes in surface elevation. The Sea would be maintained at elevations at or above the No Action condition until at least the year 2030. After that time, reduced inflow would cause the Sea to decline to about elevation -240 feet msl by the year 2077, compared to the No Action elevation of -235 feet msl. Because water surface elevation in the Sea under this strategy would be held at or above No Action conditions until at least the year 2030, conservation-related changes in the use of nesting islands by covered species would not occur as a result. Likewise, potential impacts on the tamarisk scrub community adjacent to the Sea (e.g., shoreline strand) would not be affected prior to 2030 and might be avoided altogether.

Residual Impacts

No residual impacts would occur.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

As discussed in section 3.1, in most respects the proposed action and No Forgiveness Alternative are nearly identical, although with "No Forgiveness," payback periods, and thus periods of reduced flow and reduced river stage, could be extended relative to the proposed action. The exact increase in the number of potential payback years is uncertain and dependent upon a flood event coinciding with a period when entities have overrun account balances. This alternative also would not greatly impact long-term reservoir storage. As described for the proposed action, no adverse impacts to vegetation, fish or wildlife species or special status species would occur.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

3.3 HYDROELECTRIC POWER

3.3.1 Background

Power is the last priority in regard to River operations, as stated in project-specific legislation, and as referred to under the Law of the River as described in section 1.2.2. Reclamation is the Federal agency authorized to generate power at Hoover, Davis, and Parker powerplants. Water released from Hoover Dam generates power through 17 turbines and then flows into Lake Mohave. Downstream, water is released from Davis Dam, generating power through five turbines and then flowing into Lake Havasu. South of Lake Havasu, Parker Dam generates power through four turbines. Parker Dam is the last major U.S.-owned, Reclamation-administered hydroelectric facility on the Colorado River within the Lower Basin. There is no other significant reservoir and, therefore, no significant storage downstream. All releases scheduled from Parker Dam are in response to downstream water orders or reservoir regulation requirements. In 1954, Parker and Davis Dams were consolidated into a single project, the Parker-Davis Project (P-DP). Headgate Rock Dam and Powerplant (Headgate), which is owned and operated by BIA and is located downstream of Parker Dam, is a run-of-the-river hydroplant that generates power through three turbines.

Power production can be considered in terms of capacity and energy. As used in this discussion, powerplant capacity refers to the output that a generator or facility is capable of producing at any given moment. Energy is a measure of the actual electric capacity generated over time. Generally, in a hydroelectric system, there are two factors that are directly related to power production; the head on the generating units and the quantity of water flowing through the turbines.

The head is the difference between the water surface elevation behind a dam and downstream of the dam. The maximum power that can be produced by the generators, at normal head and full flow, is the capacity of a hydroplant and is measured in megawatts (MW). The head of a powerplant is influenced by operating strategies for both the upstream and downstream reservoirs. The maximum operating capacities of the Hoover, Davis, Parker, and Headgate powerplants are 2,074 MW, 236 MW, 108 MW, and 19.5 MW, respectively.

The quantity of water flowing through the turbines (water releases) determines the amount of energy produced, measured in megawatt-hours (MWh). Between CY 1987 and CY 2000, the average net energy generated annually for Hoover, Davis, and Parker powerplants was 4,606,820 MWh, 1,154,518 MWh, and 498,666 MWh, respectively. During CY 1996 and CY 1997, the average net energy generated annually for Headgate powerplant was 87,165 MWh. CY 1996 and CY 1997 were the only years available with complete data for Headgate.

3.3.2 Affected Environment

Colorado River

Water is not released into the lower portion of the Colorado River solely to produce power; however, once water orders have been placed by downstream water users, the releases are "shaped" or scheduled to meet power needs based upon contractual obligations and to optimize power generation. After water orders have been received from the downstream water users, Reclamation and Western Area Power Administration (Western) schedule water releases to meet power generation requirements while continuing to satisfy the downstream water delivery orders. Lake Havasu is the southernmost downstream reservoir with any significant storage in the Colorado River system. To the degree storage is available, Mohave and Havasu reservoirs are used to store flows released from Hoover and Davis for power generation purposes until water is required to be released downstream to meet scheduled water deliveries to the Republic of Mexico and downstream water users in the United States.

Project Use Power (PUP) customers have the highest priority for using P-DP power. These customers include Federal projects, whether operated by the Federal government or an operator under an agreement with the U.S. Examples of PUP customers include Reclamation-owned and -operated facilities and the Wellton-Mohawk Irrigation Project, a Federal project operated by a non-Federal entity.

Western is the Federal agency authorized to market Reclamation's generation that is surplus to the amount reserved for PUP customers. Under existing contracts, Western delivers Reclamation's 50 percent share of power generated by Parker Dam Powerplant, all the power generated at Davis Dam Powerplant, and all the power generated at Hoover Dam Powerplant. Pursuant to section 302 of Public Law 95-91 (August 4, 1977) and a Joint Operating Agreement between Reclamation and Western dated February 8, 1980, Western enters into electric service contracts on behalf of the United States with private and municipal entities for the Federal government's share of power generated by the P-DP and the Boulder Canyon Project (Hoover). These contracts identify the amount of capacity allocated to each customer and the associated amount of energy on a seasonal and monthly basis.

MWD has transmission and long-term power contracts to help supply its own pumping needs. Due to MWD's role in the construction of Parker Dam and Powerplant, MWD has a perpetual contract right to 50 percent of the electric power generated at Parker Dam. Colorado River water is diverted into the Colorado River Aqueduct via the Whitsett Pumping Plant located along the western shore of Lake Havasu. MWD uses all of its contractual Federal power to pump water from Lake Havasu through the Colorado River Aqueduct to its service area in southern California. MWD pays Reclamation 50 percent of operation, maintenance, and extraordinary maintenance costs for Parker Dam, plus 15 percent of operation and maintenance costs for administrative and general purposes of Parker Powerplant.

BIA provides energy generated by Headgate's three turbines to the CRIT, and other Indian Tribes (see section 3.10 for more information about Tribal Resources). Since Headgate is a run-of-the-river hydroplant, which means it is dependent on river flow to generate power, it is unable to store water in excess of the amount capable of flowing through the generator turbines or through CRIT's diversion facilities. Any water that is not diverted by CRIT or passed through the turbines is spilled downstream.

Hoover Dam

Hoover powerplant has 17 generators and 2,074 MW maximum operating capacity. Between CY 1987 and CY 2000, the average net energy generated annually from Hoover was 4,606,820 MWh. Western markets the power to 15 customers in three States (Arizona, California, and

Nevada). Any excess energy generated at Hoover is distributed to Hoover contractors in accordance with their contracts.

Davis Dam

Davis powerplant has five generators and a 236 MW maximum operating capacity. Between CY 1987 and CY 2000, the average net energy generated annually from Davis was 1,154,518 MWh. As explained below, Davis Dam and Powerplant is part of the P-DP, and P-DP power is marketed by Western.

Parker Dam

Parker powerplant has four generators and a 108 MW maximum operating capacity. Between CY 1987 and CY 2000, the average net energy generated annually from the Parker powerplant was 498,666 MWh. MWD has a perpetual contract right to 50 percent of the electric power generated at Parker Dam. As explained below, Reclamation's 50 percent share of power generated by Parker is part of the P-DP, and P-DP power is marketed by Western.

Parker-Davis Project

The P-DP was formed in 1954 by consolidating the Parker Dam power project and the Davis Dam project. P-DP supplies power to five PUP customers and 25 firm electric service contractors. P-DP has 283 MW of capacity under contract to PUP and firm electric service customers. The total annual energy committed to the five PUP and 25 firm electric service customers is 1,345,801 MWh (PUP, 195,266.5 MWh; firm, 1,150,534.5 MWh). The contracted capacity and energy for the P-DP, including system losses and reserves, is based on Davis capacity and energy and Reclamation's half of Parker's capacity and energy. The P-DP firm electric service contracts are in effect until September 30, 2008.

As stated above PUP customers have the highest priority for using P-DP power. The second group of users having access to P-DP power hold firm electric service contracts and are called preference customers. Preference customers are entities that utilize the power for non-profit purposes, such as municipalities, cooperatives, and irrigation districts (other than those operating Federal projects). Some preference customers further distribute power received via these firm electric service contracts to other entities. Both PUP and preference customers buy P-DP power at rates that reflect the actual costs associated with the generation, transmission, and delivery of that power or "at cost." This includes the cost for administering the contracts and operation, maintenance, and replacement of the powerplants and transmission facilities.

Under the existing P-DP firm electric service contracts, the amounts of power per month and per season are guaranteed. This means if the power is not available, Western would purchase the additional power required to fulfill the contracts. During the rate process, Western estimates the cost for the previous year to purchase power under contract but anticipated not to be available when required. This is called the "purchase power cost." The purchase power cost is then figured into the rate base for P-DP firm electric service customers. If the actual purchase power cost for any given year is more or less than what was estimated, an adjustment is made in the following year's rate process so that the cost of power to P-DP firm electric service contract customers continues to reflect an "at cost" rate.

Power generated by the P-DP, over and above what has been guaranteed to PUP and preference customers having firm electric service contracts, is referred to as surplus energy. A portion of the surplus energy, referred to as excess energy, is offered to P-DP customers for purchase at an "at cost" rate or for "banking" of energy up to the limit of the contractor's contract rate of delivery. Any remaining surplus energy may be sold at market rates to interested parties or may be "banked" for future use.

Headgate Rock Dam

Headgate is owned and operated by BIA for the purpose of satisfying the power needs of CRIT and other Indian Tribes. Headgate powerplant, a run-of-the-river hydroplant, has three generators and a 19.5 MW maximum operating capacity. During CY 1996 and CY 1997, the average net energy generated annually from Headgate powerplant was 87,165 MWh. CY 1996 and CY 1997 were the only years available with complete data for Headgate. Any surplus energy not supplied to the CRIT is currently being sold to Fort Mojave Indian Tribe. No power contracts exist with non-Indian users for any portion of the power generated at Headgate.

Off-River

Because CVWD, SDCWA, and the State of Nevada and entities within the State of Nevada do not have hydroelectric power facilities on or off the Colorado River that would be affected by implementation of the proposed action, these entities are not included in the following discussion.

Imperial Irrigation District

IID operates its own power generation and transmission facilities, providing power to more than 90,000 customers in Imperial County and parts of Riverside and San Diego counties. IID operates eight hydroelectric generation plants, one generating station, and eight gas turbines. Five of these hydroelectric generation plants are drop structures on the AAC, where the water "falls" through the structure to a lower level canal. These hydroelectric generating plants along the AAC are located at Drops 1, 2, 3, 4, and 5. Two hydroelectric generation plants are located just off the AAC at canal turnouts; one at the East Highline turnout where water is diverted into the IID service area, and one at the Pilot Knob turnout, where water is diverted back into the Colorado River[1].

Electrical power generated within the IID system is sold to district customers and to others via the regional power grid. IID also purchases power from Western and other power wholesalers.

1. The channel of the Colorado River from approximately Laguna to Morelos Dam has experienced considerable sedimentation build-up as a result of flood flows from the Gila River in 1993, which has reduced the channel capacity considerably in this area. Reclamation typically routes flows around this reach of the River by diverting some of the Mexico Treaty entitlement and excess flows arriving at Imperial Dam into the All-American Canal, and returning flows to the River through both Pilot Knob and Siphon Drop (via the Yuma Main Canal and the California Wasteway). Pilot Knob returns flows to the River just above Morelos Dam, while the California Wasteway returns flows to the River further upstream. The flows that are reintroduced into the Colorado River above NIB are available to Mexico for diversion at Morelos Dam.

Metropolitan Water District

As stated in the discussions of Parker Dam above, MWD has a perpetual contract right to 50 percent of the electric power generated at Parker Dam. MWD's share of electric power out of Parker (plus their other percentage of Federal power) is used to pump water through the CRA. MWD also purchases power from Western and other power wholesalers.

Arizona

The State of Arizona or entities within the State of Arizona do not have hydroelectric power facilities located on the mainstem Colorado River that would be affected by implementation of the proposed action.

The Yuma County Water Users Association operates the Siphon Drop powerplant, a hydroelectric generation facility located on the Yuma Main Canal at Siphon Drop. The Yuma Main Canal is a turnout of the AAC and diverts water for the Yuma County Water Users Association, the YPRD and other water users in the Yuma, Arizona area. Water is returned to the Colorado River via Yuma Main Canal and the California Wasteway. Although the Siphon Drop and the Siphon Drop powerplant are located within the State of California, it is being discussed within the State of Arizona as the operating agency of Siphon Drop is in the State of Arizona.

3.3.3 Environmental Consequences

Impact Assessment Methodology

Estimated Future Energy for Hoover, Davis, and Parker

The potential impact to energy from implementation of the IA from Hoover, Davis, and Parker was evaluated by considering both the No-Action Alternative and the IA using the Riverware model. The Riverware model including model operation and assumptions was used to estimate energy and is discussed in section 3.1 and Appendix G of this EIS. To best depict the water diversions, the median statistic was used. Once the estimate was obtained, CY median energy was extracted from the Riverware energy data and converted to MWh for both No Action and the IA[2]. Due to the high degree of uncertainty with respect to future hydrologic inflows, energy figures are estimates. However, a comparison of the median of all modeled future energy estimates can adequately show the impacts of the proposed action.

Graphs were created to illustrate the difference between the No Action estimated energy and the IA estimated energy for the 75-year period of analysis. These graphs are included below in the following sections.

2. Energy was estimated by multiplying the estimated Headgate outflow by 12.97 kWh/AF to obtain a gross energy value, which was then converted to MWh. The 12.97 kWH/AF was determined by averaging the monthly kWh/AF data from CYs 1996-1998. An average of station service was subtracted from the gross generation to obtain the net generation.

Estimated Energy for Headgate

The potential impact to energy from implementation of the IA from Headgate was evaluated by considering both the No-Action Alternative and the IA. The amount of water that would flow through the turbines was estimated by subtracting the CRIT irrigation diversions (diverted above Headgate turbines) from the Parker Dam outflows (there are no other major water diversions between Parker and Headgate Dams). This water was termed the Headgate outflow. Parker outflow and CRIT irrigation diversions were estimated using the Riverware model including model operation and assumptions as discussed in section 3.1 and Appendix G. To best depict the water diversions the median statistic was used. The CY median Headgate outflow was then extracted and converted to energy in MWh for both No Action and the IA. Due to the high degree of uncertainty with respect to future hydrologic inflows, energy figures are estimates. However, comparisons of the median of all modeled future inflows can adequately show the impacts of the proposed action.

Graphs were created to illustrate the difference between the No Action estimated energy and the IA estimated energy for the 75-year period of analysis. These graphs are included below in the following sections.

No-Action Alternative

No Action for Implementation Agreement

Under the No-Action Alternative, Reclamation would continue to operate Colorado River facilities consistent with the Law of the River as described in Chapter 1. Estimated River flows under the No-Action Alternative were determined using the Riverware model, and estimated hydroelectric power production was determined, and is graphically displayed in Figures 3.3-1 through 3.3-5. There would be no change to current River regulation and no impacts to hydroelectric power would occur.

No Action for Inadvertent Overrun Policy

Under the No-Action Alternative the Secretary would apply existing law and not deliver water in excess of a water users entitlement. There would be no change to current River regulation and no impacts to hydroelectric power would occur.

No Action for Biological Conservation Measures

Under this alternative, the biological conservation measures would not be implemented, and no impacts related to hydroelectric power would occur.

Proposed Action

Implementation Agreement

This section discusses the potential impacts of implementation of the IA to hydroelectric power. Potential impacts of the IA are discussed as differences between No Action and the IA. The impacts are based on the difference between median No Action energy and the median IA

Figure

3.3-1 Hoover Estimated Median Net Energy under No Action and IA

(B & W)

Figure

3.3-2 Davis Estimated Median Net Energy under No Action and IA

(B &W)

Figure

3.3-3 Half of Parker Estimated Median Net Energy under No Action and the IA

(B&W)

Figure

3.3-4 Parker-Davis Project Estimated Median Net Energy under No Action and IA

(B&W)

Figure

3.3-5 Headgate Estimated Median Net Energy under No Action and IA

(B & W)

energy. Any energy figures shown are not meant to be future energy projections, but are only estimates of future energy to assist in the determination of potential impacts from the IA.

COLORADO RIVER

Capacity. Changing the point of delivery of approximately 388 KAF of Colorado River water per year from Imperial Dam to Lake Havasu would not result in measurable changes to the elevation of Lakes Mead, Mohave, and Havasu. Projected elevations of Lake Mead are discussed in section 3.1 and are expected to be minimal. The water elevation of Lake Mohave would also not be impacted by implementation of the IA due to Reclamation's current operation of Davis Dam. Lake Havasu is the last reservoir used to retain flows released from Hoover Dam and Davis Dam until required for water deliveries to downstream users in the U.S. and the Republic of Mexico. This use of Lake Havasu to re-regulate flows would not be impacted by the implementation of the IA, and the water elevation behind Parker Dam would not be altered by any measurable extent. Therefore, the capacity of Hoover Dam, Davis Dam and Parker Dam powerplants would not be impacted with the implementation of the IA.

Due to the design and operation of Headgate Dam, implementation of the IA would not result in a change in the water elevation of Lake Moovalya. However, implementation of the IA would result in a reduction in the amount of water flowing through this reach of the River over the course of a year. Therefore, the capacity of the Headgate powerplant would not be impacted with the implementation of the IA.

Since the IA would not have a measurable impact on the capacity of the powerplants along the lower portion of the Colorado River, this analysis is only concerned with the potential impacts to energy.

Energy. Due to the high degree of uncertainty with respect to future hydrologic inflows, energy figures are estimates. However, comparisons of the median of all modeled future inflows can adequately show the impacts of the proposed action.

Since Western is only responsible for marketing a generated surplus to meet Reclamation needs), at cost and delivering all the energy to contracted points of delivery, Western would not be impacted by the IA. Western's customers could be minimally impacted by the loss of energy at Parker, which is part of the P-DP.

MWD could be economically impacted by implementation of the IA, as the reduction in energy would mean less Federal power to pump Colorado River water through the Colorado River Aqueduct. Refer to the Parker section below for more information.

BIA would be impacted by the IA due to a small percentage of energy forgone at Headgate Rock Dam (see also Tribal Resources, section 3.10). Refer to the Headgate Rock Dam discussion below for more information.

Hoover Dam. Hoover's contracts are based on contingent capacity and firm energy; to the extent there are shortages, each contractor would share pro rata of what is available with the other contractors. Under firm energy deficiency conditions, Western is not obligated to purchase energy; however, the contractors can request Western make purchases on their behalf.

The energy estimated for No Action and IA are essentially the same. Over the 75 years modeled, the average difference is less than 1 percent; therefore, impacts would be negligible. Figure 3.3-1 shows Hoover estimated median net energy under No Action and the IA.

Davis Dam. The energy estimated for No Action and IA are essentially the same. Over the 75 years modeled, the average difference is less than 1 percent; therefore, impacts would be negligible. Figure 3.3-2 shows Davis estimated median net energy under No Action and the IA.

Parker Dam. The average percentage of energy foregone due to the IA over the 75-year period is estimated to be 4.84 percent (or 10,967 MWh less than No Action). The maximum percentage of energy foregone due to the IA over the 75-year period is estimated to be 5.67 percent (or 12,845 MWh less than No Action). Half of Parker's estimated median net energy under No Action and the IA is shown graphically in Figure 3.3-3.

As stated previously, Parker energy is divided equally between Reclamation and MWD. If water flows are low, resulting in lower energy production, the loss of Reclamation's share of Parker would impact P-DP by having less excess energy available and possibly causing the need to purchase power. MWD could be economically impacted, because the reduction in energy would mean less Federal hydroelectric energy to pump Colorado River water through the Colorado River Aqueduct.

Parker/Davis Project. The Parker-Davis firm electric service contracts guarantee a specific amount of firm energy will be delivered to the contractors, monthly and per season. If there is insufficient generation available to supply the contracted amount of energy, Western must purchase the required energy. Costs are passed along to the customers.

The average percentage of energy foregone due to the IA over the 75-year period is estimated to be less then 1 percent. The maximum percentage of energy foregone due to the IA over the 75-year period is estimated to be 1.32 percent (or 17,536 MWh less than No Action), which is considered to be minor. Figure 3.3-4 shows P-DP estimated median net energy under No Action and the IA.

The reduction of energy in the P-DP would not impact the ability to meet PUP obligations. Throughout the 75-year quantification period there would be less chance of excess energy being available to P-DP customers. Excess energy is not guaranteed; it is something the contractors should not plan on in future years. Depending on the actual hydrology for CY 2007 and CY 2008 Western would likely have to purchase power and would not have surplus energy available to help offset the costs. This would cause P-DP rates to be increased. Since the existing P-DP contracts expire on September 30, 2008, any energy forgone should be taken into consideration during the next contract period. With that said the major impact to the P-DP could be fewer resources available for contract in October 2008 and out.

The implementation of the IA would potentially impact the P-DP preference customers through excess energy foregone or a percentage of excess energy foregone, a potential increase in rates and a reduction in future contract resources.

Headgate Rock Dam. The average percentage of energy foregone due to the IA over the 75-year period is estimated to be 5.37 percent (or 4,298 MWh less than No Action). The maximum percentage of energy foregone due to the IA over the 75-year period is estimated to be 6.30 percent (or 5,035 MWh less than No Action). Figure 3.3-5 shows Headgate estimated median net energy under No Action and IA.

Currently Headgate generates more energy then is needed by CRIT. Implementation of the IA should not impact Headgate's ability to meet CRIT's current energy demands. However, implementation of the IA could impact BIA's ability to meet CRIT's planned energy growth and BIA's efforts to connect CRIT's additional California reservation energy demand. A reduction in Headgate energy could impact BIA's ability to meet new tribal energy demands. Implementation of the IA could also have a potential impact on Headgate rates if the rates are based on an estimated hundred percent of energy generated at Headgate.

OFF-RIVER (OTHER GEOGRAPHICAL AREAS)

CVWD, SDCWA and the State of Nevada or entities within the State of Nevada do not have hydroelectric power facilities that would be impacted by implementation of the proposed action. Therefore, no hydroelectric power impacts to these entities would occur.

Imperial Irrigation District. For similar reasons as stated above, implementation of the IA would not impact the capacity of the hydroelectric power facilities operated by IID. The IA does have the potential to impact the amount of water that would flow through the powerplant and, therefore, could impact energy production at the hydroelectric power facilities operated by IID.

The flows in the AAC would be decreased by the implementation of the IA, which could decrease the energy production at Drop Nos. 1, 2, 3, 4, 5, and East Highline. Energy production at Pilot Knob is dependent on water routed into the AAC and through Pilot Knob by Reclamation. Implementation of the IA would not change Reclamation's current operation of routing River flows through the AAC.

Metropolitan Water District. Potential impacts to MWD from implementation of the proposed action are discussed in the Parker Dam section above.

ARIZONA

Energy production at Siphon Drop is dependent upon water orders by Colorado River water users that are serviced by the Yuma Main Canal and water routed into the AAC and through Siphon Drop by Reclamation. Implementation of the IA would not change water orders by users that are serviced by the Yuma Main Canal and would not change Reclamation's current operation of routing River flows through the AAC.

Economic Impacts. Reclamation would not be financially impacted by the water diversions. All of Reclamation's power-related costs are collected from rates, base charges, or advance funding from the power customers. Any reduction in energy from the P-DP would be calculated into the rate process; therefore, Reclamation would not lose any revenues. Hoover's Base Charge would not be affected by the IA; therefore, there would be no financial impact to Reclamation.

Western would not be financially impacted by the water diversions. All of Western's power-related costs are collected from rates, base charges, or advance funding from the power customers. If purchase power were required, the cost would be passed to the customers.

P-DP customers would be financially impacted, because Western is required to purchase power on the open market to fulfill contract requirements (and/or collect reduced surplus sales revenues) and pass the costs to the customers. To the extent excess energy is reduced or eliminated, some of the P-DP customers may have to purchase peaking power on the open market. Excess energy is not guaranteed. Any excess energy the customers receive is a benefit to them, not an obligation of the United States. When the P-DP contracts expire on September 30, 2008, Western and Reclamation could need to reduce the energy available for contracts after 2008. It would be expected that the P-DP customers would be able to contract for any energy shortfall under other long-term arrangements rather than by purchasing on the open market.

The reduction in Headgate energy by an average of 5.37 percent could impact BIA's ability to meet new tribal energy demands, which would mean that the reduced increment of power would have to be purchased on the open market, or other means, one being by additional power contracts if additional long term energy is proven to be needed. If the open market rate is higher than that charged by BIA, this could be an economic impact to the Tribe. BIA could be impacted by having less surplus power to sell, resulting in a reduction in revenue for its operations and maintenance costs.

MWD could be economically impacted by any reduction in energy at Parker as MWD uses all of its Federal hydroelectric energy to pump water from Lake Havasu through the Colorado River Aqueduct. MWD might have to purchase energy to replace any reduction at Parker.

CAP may have a financial impact as a result of the water diversions. Pursuant to the Hoover Powerplant Act of 1984, CAP will receive revenues from an added rate (or surcharge) on P-DP energy sales beginning in June 1, 2005; any reduction in energy would reduce this revenue.

Due to deregulation, high natural gas prices, lack of generation supply in California and other market conditions, the price of energy has been extremely volatile since 1999. Like the hydrology estimates, any future estimate for the price of energy is very rough at best. To allow for a rough estimate of what the reduction in energy could cost, the following estimated average costs could be used. At this time an overall average open market price is estimated to be around $35 per MWh based on historic Palo Verde indexes (WAPA 2001). An average firm energy or long term costs are estimated around $40 per MWh (based on a projection of firm rates in Arizona and New Mexico). For P-DP customers only, it is assumed that the P-DP firm energy rate is $5 per MWh making the net additional cost of $35 per MWh for firm energy.

Adoption of Inadvertent Overrun Policy

The IOP would result in changes to Colorado River flows from year to year, with slightly higher flows in overrun years and slightly lower flows in payback years. Accurately estimating future changes to River flows due to the IOP is not possible as considerable assumptions would be required regarding the timing and magnitude of overruns and paybacks by water users. Therefore, the analysis prepared for the IOP is based on the estimated maximum overrun amount in any one year (313 KAF above Parker Dam and 313 KAF below Parker Dam), the estimated average overrun based on an average of all overruns for both the one-year and three-year payback scenarios (90 KAF above Parker Dam and 90 KAF below Parker Dam), the estimated maximum payback amount in any one year (206 KAF above Parker Dam and 176 below Parker Dam), and the estimated average payback based on an average of all paybacks for both the one-year and three-year payback scenarios (72 KAF above Parker Dam and 63 KAF below Parker Dam) as described in Appendix C.

The IOP would have positive impacts on power production during overrun years and negative impacts during payback years. Power production at Hoover, Davis, Parker, and Headgate Rock Dams would be impacted.

- During the 75-year period, the maximum impact to Hoover in any given year could be a 3.6 percent increase in energy (144,401 MWh), or a 2.4 percent decrease in energy (95,037 MWh). On average, the estimated impact of the IOP to Hoover could be a 1.0 percent increase in energy (37,558 MWh), or a 0.8 percent decrease in energy (30,046 MWh).

- During the 75-year period, the maximum impact to P-DP in any given year could be a 3.8 percent increase in energy (47,496 MWh), or a 2.4 percent decrease in energy (30,257 MWh). On average the estimated impact of the IOP to P-DP could be a 1.1 percent increase in energy (13,609 MWh), or a 0.8 percent decrease in energy (10,586 MWh).

- During the 75-year period, the maximum effect to Parker in any given year could be a 4.9 percent increase in energy (20,925 MWh), or a 2.7 percent decrease in energy (11,766 MWh). On average the estimated impact of the IOP to Parker could be a 1.4 percent increase in energy (6,013 MWh), or a 1.0 percent decrease in energy (4,209 MWh).

- During the 75-year period, the maximum effect to Headgate in any given year could be a 5.4 percent increase in energy or 4,060 MWh, or a 3.0 percent decrease in energy or 2,283 MWh. On average the estimated impact of the IOP to Headgate could be a 1.5 percent increase in energy (1,167 MWh), or a 1.1 percent decrease in energy (817 MWh).

The above analysis is an estimate based on the maximum overrun amount in one year, an average overrun based on an average of all overruns for both the one-year and three-year payback scenarios, maximum payback amount in one year, and an average payback based on an average of all paybacks for both the one-year and three-year payback scenarios, and should not be considered estimates of potential yearly impacts of the IOP.

As stated above, power production at Pilot Knob and Siphon Drop is a function of water routed into the AAC and through Pilot Knob and Siphon Drop power plants by Reclamation. Water routed is used for satisfaction of the United States-Mexico Water Treaty of 1944 and deliveries in excess of the United States-Mexico Water Treaty of 1944. As discussed in section 3.1, and section 3.12, the IOP may slightly reduce the magnitude and frequency of flood flows to Mexico. This may also slightly reduce the power production at Pilot Knob and Siphon Drop as some of these excess flows may have been routed into the AAC and flowed through the Pilot Knob or Siphon Drop power plants. Although the IOP may reduce the magnitude and frequency of flood flows to Mexico, Reclamation's operation of the River would determine the amount of water that flows through the Pilot Knob and Siphon Drop power plants.

Adoption of the IOP would have a negligible impact to power generation at the various IID drops with a positive or beneficial impact in overrun years with a slight increase in flow of the AAC, and a negative impact in payback years with a slight decrease in flow of the AAC. Over the long term this is not expected to have a measurable impact on IID.

Implementation of Biological Conservation Measures

Implementation of the biological conservation measures would have no impact to hydroelectric power.

Mitigation Measures

Under the Law of the River and under project specific legislation, power production has the lowest priority in terms of Colorado River operations. Reclamation would continue to work closely with Western to schedule water releases for satisfaction of water orders and to optimize power production at the various facilities. However, based on the fact that power production is a result of water releases to meet water orders, no mitigation for hydroelectric power is proposed.

Residual Impacts

There would be a residual impact of about a 5 percent reduction in power produced at Parker and Headgate Rock Dams as a result of the water transfers. More water would be diverted at Lake Havasu and less water would flow downstream through these two powerplants for diversion at Imperial Dam.

Alternative to the Inadvertent Overrun Policy

No Forgiveness During Flood Releases Alternative

The No-Forgiveness Alternative would have similar impacts to hydroelectric power production as the proposed IOP. The No-Forgiveness Alternative would require payback of account balances, which may slightly decrease hydroelectric power generation as water users are delivered less water in a payback year. Although under the No-Forgiveness Alternative there may be a slight increase in power generation as there may be a slight increase in the magnitude and frequency of flood control releases as compared to the proposed IOP. The slight increase and slight decrease in hydroelectric power production is expected to balance out, and impacts of the No-Forgiveness Alternative would be similar to those seen with the proposed IOP.

Mitigation Measures

As discussed above for the proposed action, no mitigation for hydroelectric power is proposed.

Residual Impacts

There would be a residual impact of about a 5-percent reduction in power produced at Parker and Headgate Rock Dams as a result of the water transfers. More water would be diverted at Lake Havasu and less water would flow downstream through these two powerplants for diversion at Imperial Dam.

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3.4 LAND USE

3.4.1 Affected Environment

Land Use Plans and Policies

California

Most of the area directly or indirectly affected by the proposed action is in Southern California. As the designated Metropolitan Planning Organization, the Southern California Association of Governments (SCAG) is mandated by the Federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality. Additional mandates exist at the State level. SCAG serves six of the seven counties (Ventura, Los Angeles, Orange, San Bernardino, Riverside and Imperial Counties) that are served by the four water agencies whose water supplies would be altered by the IA. Regional planning services for San Diego County are provided by the San Diego Association of Governments (SANDAG).

This section addresses the planning programs and policies of SCAG and SANDAG, the regional jurisdictions within the project area that have land use planning authority, as well as those of the BLM. Because current law requires county and municipal general plans to be consistent with adopted regional plans, a review of these local plans was not conducted.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS — REGIONAL COMPREHENSIVE PLAN AND GUIDE

SCAG is a regional planning agency whose functions include regional transportation planning, air quality planning, demographic projections, and the review of proposed projects of regional significance to determine consistency with regional plans, including SCAG's Regional Comprehensive Plan and Guide (RCPG). SCAG's RCPG (1996) contains the following relevant planning principles:

3.01 The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation and review.

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

3.09 Support local jurisdictions' effort to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.

3.20 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.

5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.

Water Resource Chapter Recommendations

The Water Resource Chapter (WRC) of the RCPG is a non-mandated chapter, and it is provided for information and advisory purposes. The recommendations contained in this chapter to fulfill the stated goals and objectives do not create new legal mandates for local governments or other regional organizations. SCAG signed a Memorandum of Understanding (MOU) with MWD, as the largest wholesale water agency in the region, to develop the WRC. The WRC also includes projections of water supply and demand for areas within the SCAG region, outside the MWD service area.

The WRC identifies potential programs that would help meet the projected future water supply needs. These include potential programs related to Colorado River water supply and use, such as the AAC and Coachella Canal Lining, Interstate Underground Storage of Unused Colorado River Water, Phase II Water Conservation Program with Imperial Irrigation District and the Modified Irrigation Practices and Land Fallowing Proposal of Imperial Irrigation District. The WRC also recognizes currently planned SWP transfer programs, other water transfer and exchange programs, and local management strategies.

San Diego Association of Governments — Regional Growth Management Strategy

SANDAG works with local cities within San Diego County, the County of San Diego, and other local agencies to conduct certain planning activities at a regional level. These activities consist of planning for public facilities financing, housing, energy, land use, growth management, open space/environmental/habitat conservation, waste management, airport land use, binational coordination, watershed/water quality, and shoreline erosion at a regional scale. While the region's cities and the County of San Diego have control over local land use policies, SANDAG provides a forum for these jurisdictions to coordinate planning for the San Diego region as a whole (SANDAG 1999).

In 1999, SANDAG launched REGION 2020, its regional growth management strategy. The strategy consists of five interrelated elements and is based on the idea that most growth-related issues can be addressed within the context of one or more of the elements. The elements include economic prosperity, transportation, housing, open space and environment, and fiscal reform/infrastructure financing. REGION 2020 provides a comprehensive, cohesive framework for dealing effectively with the impacts of growth in the San Diego region. The actions contained in REGION 2020 are intended to preserve or improve the region's quality of life. The following policy related to the Water Supply/Water Quality quality-of-life factor is applicable to the proposed project:

> *Ensure a sufficient supply of water, and improve the quality of our coastal waters, bays, reservoirs, streams and groundwater.*

Bureau of Land Management — California Desert Conservation Area

The BLM administers extensive lands in the Southern California desert region. Portions of the program area are located within the California Desert Conservation Area (CDCA). The CDCA is a 25-million-acre area that was created by the Federal Land Policy and Management Act of 1976. The act directed the Secretary to prepare and implement a comprehensive, long-range plan for the management, use, development, and protection of public lands within the CDCA.

The goal of the CDCA plan is to "Provide for the use of the public lands and resources of the CDCA, including economic, scientific, educational, and recreational uses, in a manner which enhances wherever possible – and which does not diminish, on balance – the environmental, cultural, and aesthetic values of the Desert and its future productivity" (BLM 1980).

LOCAL PLANNING PROGRAMS

Each of the counties within the area affected by the proposed action maintains a general plan that guides land use and development decisions within the respective county jurisdictions. These plans are based on population and housing projections established by the regional planning agencies, SCAG and SANDAG. Comparable plans are in place for each of the incorporated cities. As mentioned above, these plans are required by law to be consistent with regional-level plans.

Land Use Plans and Policies — Western Arizona

The Western Arizona Council of Governments (WACOG) is a regional agency that includes Mohave, La Paz, and Yuma Counties in western Arizona. Currently, WACOG does not have a regional plan in place that addresses water resources policy issues for western Arizona.

Many Arizona counties and municipalities are currently in the process of updating their general plans in accordance with recent growth management legislation by the State. In western Arizona, La Paz County does not currently have a general plan in place, but will be developing a plan in late 2001 and 2002. Mohave County is currently revising water-related policies in the natural resources element of its general plan. Yuma County is currently preparing a general plan update that will include water resources policies.

Land Use Plans and Policies — Southern Nevada

Clark County, Nevada has an adopted comprehensive plan that establishes planning policies for the southernmost portion of Nevada. The Conservation Element of this plan contains a number of policies related to water resources management in the county that focus primarily on the water quality of surface waters that flow into the Colorado River and Lake Mead, groundwater use, and water conservation.

Existing Land Uses

This section summarizes land uses within the project study area. Information on land uses is provided for the Colorado River corridor, which includes southeastern California, western Arizona, and southern Nevada; the service areas for each of the major water districts within the project area, and the Salton Sea area.

Colorado River (Including Southeastern California, Western Arizona, and Southern Nevada)

Land uses along the lower portion of the Colorado River are under a number of jurisdictions, including Clark County, Nevada; La Paz, Mohave, and Yuma Counties, Arizona; and San Bernardino, Riverside, and Imperial Counties, California. Incorporated cities along the River include Laughlin, Nevada; Needles and Blythe, California; and Bullhead City, Lake Havasu

City, and Parker, Arizona. Several Indian reservations are located along the River, as well, including the Fort Mojave, Chemehuevi, CRIT, and Fort Yuma Reservations. Indian tribes are sovereign nations and reservation lands are not subject to local land use controls. A number of Federal agencies manage federally owned land along the River, including the BLM, FWS, Department of Defense, and National Park Service. Other land is under the jurisdiction of individual States. The majority of the Colorado River region is undeveloped with scattered suburban and rural development. The area contains the Imperial, Cibola, and Havasu National Wildlife Refuges, and a number of parks and recreation areas, including Picacho State Recreation Area, Buckskin Mountain State Park, and Lake Mead National Recreation Area (refer to section 3.5 for additional detail on recreational resources).

Imperial Irrigation District

The IID service area is within Imperial County, and includes the local municipalities of Calipatria, Westmorland, Brawley, Holtville, El Centro, and Calexico. Agricultural lands with scattered suburban and rural development occupy the majority of the IID service area. The water conservation measures that are related to the implementation of the IA would take place in rural areas.

Coachella Valley Water District

The CVWD service area is located in Riverside County, and includes numerous municipalities, including the cities of Indio, Palm Desert, Cathedral City, La Quinta, and Rancho Mirage. Over 90 percent of the Coachella Valley (which is larger than the service area alone) is open space, and only 3 percent of the land is residential. Most of the lands within the service area are either private lands or are public lands administered by the BLM. Five Indian reservations are located wholly or partially within the CVWD service area. The Agua Caliente Indian Reservation is located in the Upper Valley, and the other four are located in the Lower Valley. These include the Augustine, Cabazon, Torres Martinez, and Twenty-Nine Palms Indian Reservations. Implementation of the IA would result in the construction of facilities such as recharge basins, pipelines, and pump stations in the CVWD service area – primarily in the Lower Coachella Valley. Land uses in the Lower Coachella Valley include extensive agricultural uses and recreational uses such as golf courses.

Metropolitan Water District

The MWD service area largely covers the urban, suburban, and rural areas of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. The urbanized areas contain a wide variety of land use patterns, including residential communities and commercial and industrial uses.

San Diego County Water Authority

The SDCWA service area is located in the western portion of San Diego County. The region is characterized by a variety of urban, suburban, and rural land uses. The urbanized areas contain a wide variety of land use patterns, including residential communities and commercial and industrial uses.

Salton Sea

The Salton Sea crosses the Riverside and Imperial County boundary and borders upon San Diego County. Agricultural lands with scattered suburban and rural development occupy the majority of the Salton Sea region. A number of unincorporated communities surround the Sea and consist primarily of single-family residences, RV and trailer parks, beaches, marinas, and commercial uses. The latter provide services for tourists and area residents.

Recreational uses, including the Salton Sea State Recreation Area, are prevalent in the immediate vicinity of the Sea, as described in section 3.5. The Sonny Bono National Wildlife Refuge is located in and along the southern portion of the Sea, and the Imperial Wildlife Refuge Area-Wister Unit is located along the east shore of the Sea. Geothermal hydroelectric facilities are present on the southwest shore. The U.S. Navy's Salton Sea Test Base covers 12,180 acres of water in the southwest portion of the Sea, as well as 7,240 acres of the adjoining land. The Torres Martinez Reservation is north and west of the Sea. The reservation occupies approximately 24,000 acres of land interspersed with private holdings and BLM land; about 11,800 acres of the reservation are submerged (USBR and SSA 2000). Much of the land in this area is used for agricultural purposes.

3.4.2 Environmental Consequences

Impact Assessment Methodology

The potential for inconsistencies with existing regional land use policies was considered along with the potential for physical changes to land uses.

No-Action Alternative

No Action for Implementation Agreement

If the IA were not implemented, no substantive land use changes in the project study area or conflicts with existing policies are expected to occur. The reliability of Colorado River water supplies would not be increased for CVWD, MWD, and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. During drought years, extreme conservation measures or rationing might be required. None of these actions would be likely to impact development patterns or land use trends.

As noted in section 3.1, the Salton Sea is expected to decline from its current elevation of about –227 feet to about elevation –235 feet over the 75-year study period (2002–2077) under the No-Action Alternative (i.e., no water transfers). Salinity of the Salton Sea would continue to increase from its current 44,000 mg/l to about 86,000 mg/l. A significance threshold of 60,000 mg/l, beyond which fish are not expected to survive, would occur in about year 2023 (personal communication, P. Weghorst 2001). This would result in substantive impacts to recreational uses, as described in section 3.5.

No Action for Inadvertent Overrun and Payback Policy

Under this alternative, the Secretary would enforce the obligations under the Decree to ensure that no Colorado River user exceeds its entitlement amount. This could include reducing deliveries for those water users that overrun and/or stopping deliveries for water users that are at their entitlement amount. These short-term changes to the water supply would have no long-term impact on development patterns or land use trends and would not result in a conflict with land use plans and policies.

No Action for Biological Conservation Measures

Not implementing the proposed biological conservation measures would have no impact on existing or future land uses; nor would it conflict with any land use plans and policies.

Proposed Action

Implementation Agreement

A discussion of the IA's consistency with relevant regional land use plans and policies is provided in Table 3.4-1.

COLORADO RIVER (INCLUDING SOUTHEASTERN CALIFORNIA, WESTERN ARIZONA, AND SOUTHERN NEVADA)

The IA would not result in any construction or changes to land use patterns around the Colorado River. There would be a slight reduction (within the normal range of variability) in surface elevation between Parker and Imperial Dams, although this would not impact any land uses.

IMPERIAL IRRIGATION DISTRICT

With implementation of the IA and QSA, IID would implement water conservation programs and the consensual cap on Priority 3a diversions, making water available for the QSA water transfers to CVWD, MWD, and SDCWA. The proposed water conservation measures, which may include on-farm measures and/or system measures within the IID service area, would not result in any substantive land use impacts. The on-farm and system conservation measures would be implemented on agricultural land and would not change land uses. If fallowing is implemented as a conservation measure, agricultural land would be removed from production on a short-term or long-term basis during the term of the IA (see section 3.6 for more details); no other aspects of implementation of the IA would alter other land uses in this area. Recreational uses would not be substantively impacted (section 3.5), and no changes to population or housing are expected (section 3.7).

COACHELLA VALLEY WATER DISTRICT

No aspects of the IA would substantively alter land uses in the CVWD service area. Agricultural uses would not change (section 3.6), recreational uses would not be substantively impacted (section 3.5), and no changes to population or housing are expected (section 3.7). The additional water transferred to the CVWD would be used to replenish overdrafted

Table 3.4-1. Consistency with Regional Land Use Plans and Policies

SCAG Regional Comprehensive Plan and Guide	
3.01 *The population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, shall be used by SCAG in all phases of implementation/review.*	The IA would not change population, housing, or forecasts in any of the service areas of the four agencies whose water supplies would be impacted by the IA. Implementation of the IA is consistent with this policy.
3.03 *The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.*	As noted above, the IA would not generate any growth in the SCAG region; the timing, financing, and location of the IA components would not be a factor in SCAG's implementing these policies.
3.09 *Support local jurisdictions' effort to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.*	The IA was developed as a means of allowing California to live within its normal-year apportionment of Colorado River water in as cost-effective and efficient a manner as possible. If the IA were not implemented, the structural projects that are embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, would lose $200 million in State funding, which may reduce the likelihood of their implementation.
3.20 *Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.*	This EIS includes mitigation measures to minimize impacts to such resources, as will the project-specific environmental documents that are being prepared for individual program components.
5.11 *Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.*	This EIS considers impacts to these resources from implementation of the IA. Preparation of this EIS is consistent with the intent of this policy.
SCAG Water Resource Recommendations	The proposed IA includes the implementation of a number of strategies identified in SCAG's RCPG Water Resources Chapter.
SANDAG Regional Growth Management Strategy	
Ensure a sufficient supply of water, and improve the quality of our coastal waters, bays, reservoirs, streams and groundwater.	This policy provides direction to SANDAG to support the availability of a sufficient water supply for the region. The IA is intended to ensure a reliable water supply to meet demands in the SDCWA service area, which would be consistent with this policy. The program would not specifically improve water quality in the SANDAG region, but neither would it have adverse impacts. Overall, implementation of the IA would be consistent with this policy.

groundwater aquifers, which is consistent with current regional planning. Project-related impacts would be limited to the direct impacts of construction. Pipelines would be placed mainly in existing streets, pump stations would be in agricultural areas, and recharge basins would be in open space, where they would not interfere with surrounding land uses. No adverse land use impacts would occur.

METROPOLITAN WATER DISTRICT

No aspects of the IA, including water deliveries to Escondido, the Vista Irrigation District, and the San Luis Rey settlement parties, would alter land uses in the MWD service area. Recreational uses would not be substantively impacted (section 3.5), and no changes to population or housing are expected as a result of the IA (section 3.7). No construction would occur, nor would operational changes that would in any way physically divide communities or otherwise impact land uses.

SAN DIEGO COUNTY WATER AUTHORITY

The reliability of SDCWA's water supply would increase under the IA, although this would not lead to changes in land use within the SDCWA service area. No other aspects of the IA are expected to alter other land uses in the SDCWA service area. Recreational uses would not be substantively impacted (section 3.5), and no changes to population or housing are expected (section 3.7). No construction would occur, nor would operational changes that would in any way physically divide communities or otherwise impact land uses.

SALTON SEA

With implementation of the IA and QSA, IID would undertake water conservation measures that could decrease inflows to the Salton Sea, which would accelerate the increase in the Sea's salinity. These consequences would not physically divide the community or otherwise result in a direct change to land use patterns, although this could impact the area's desirability for recreational use, as described in section 3.5. Recreational use of the area, including sport fishing, is likely to decline sooner, given the acceleration of impacts to fish that would result from the increased salinity. This potential decrease in recreational activities would eventually occur whether or not the QSA water transfers were implemented since salinity levels of the Sea would increase independently of implementation of the IA and QSA. The lands of the Torres Martinez Reservation, some of which underlie the existing Sea, would be impacted, since their lands would be exposed sooner and to a greater extent than under No Action. The more rapid decline of the shoreline has the potential to impact Torres Martinez land uses. Sections 3.5 (Recreational Resources) and 3.10 (Tribal Resources) describe mitigation measures that would minimize or avoid impacts from reduced inflows to the Salton Sea.

Adoption of Inadvertent Overrun and Payback Policy

The IOP would identify inadvertent overruns of Colorado River water, establish procedures that account for inadvertent overruns, and define subsequent payback requirements. These actions would not result in changes to existing land use patterns or land use trends. No conflicts with land use plans and policies are anticipated. There is a potential for short-term fallowing to occur in the IID service area during payback years, but this temporary change in agricultural practices would not impact underlying agricultural designations or otherwise impact land use.

Implementation of Biological Control Measures

The fish stocking/breeding measures would not impact land uses along the Colorado River or conflict with existing land use plans and policies. Habitat restoration could result in a change from agricultural use to backwaters or cottonwood-willow habitat. This change would not in itself constitute a land use impact.

Mitigation Measures

No mitigation measures specific to land use are proposed.

Residual Impacts

No residual impacts would occur.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

Impacts would be as described for the proposed action. No changes in land use would occur and no conflicts with land use plans and policies would result from this alternative.

Mitigation Measures

No mitigation measures specific to land use are proposed.

Residual Impacts

No residual impacts would occur.

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3.5 RECREATIONAL RESOURCES

3.5.1 Affected Environment

Colorado River

The Colorado River provides the backdrop for an extensive network of primarily water-related recreational uses along the California-Arizona-Nevada State lines. The dams that have been constructed along the River provide a network of connected reservoirs that extend along the trace of the mainstem.

Glen Canyon National Recreation Area

Lake Powell is a key component of the Glen Canyon National Recreation Area, which is located in southern Utah and northern Arizona. The Lake receives approximately 2.6 million visitors annually (USBR 2000). Typical recreation activities that occur at Lake Powell include swimming and sunbathing, power boating, fishing, off-beach activities associated with boat trips (such as hiking or exploring ruins), house boating, personal watercraft use, canoeing, kayaking, and sailing (USBR 2000). Recreational boating is the most common type of boating activity on the Lake.

Public use facilities along the shoreline of the Lake are located at Wahweap, Dangling Rope Marina, Halls Crossing, Bullfrog, Hite, and Antelope Point and include lodging, restaurants, boat slips, mooring buoys, rental houseboats, rental small boats, launch ramps, beaches, trails, and stores. In 1993, the National Park Service extended a number of boat ramps to an operable level of 3,612 feet msl, including those at Wahweap, Halls Crossing, Bullfrog, Hite (the ramp area at this facility is known to be usable down to 3,630 feet msl). All of the facilities at Dangling Rope Marina float and are accessible only by boat. The existing boat ramp at Antelope Point currently extends down to 3,677 feet msl. The National Park Service has provided Reclamation with construction drawings for extending the boat ramp down to 3,620 msl as the water elevation declines. The extended boat ramp would allow houseboats and other watercraft to launch down to elevations around 3,625 feet msl, assuming 3 feet of freeboard. The National Park Service also provided Reclamation with a preliminary Antelope Point Marina layout drawing for a reservoir elevation of 3,600 feet msl, but it has not been established that a marina would be operable at this level (USBR 2000). At Rainbow Bridge National Monument, the docks and trail system are designed to accommodate lake level fluctuations allowed in the operation of Glen Canyon Dam and powerplants (from 3,490 feet msl to 3,700 feet msl). If the lake levels drop below 3,650 feet msl, the dock facilities will be moved and the old land trail through Bridge Canyon (which is submerged at full pool) would be hardened and used for access. At some lake levels, it may not be feasible to maintain water access to the monument, but the specific elevation is not known (USBR 2000).

Three elevations have been identified as representative threshold elevations below which shoreline facilities at Lake Powell could be affected. These are 3,677 feet msl (for the existing boat ramp at Antelope Point), 3,626 feet msl (for the extended boat ramp at Antelope Point), and 3,612 feel msl (for the boat ramps at Wahweap, Halls Crossing, Bullfrog, and Hite) (USBR 2000).

Lake Mead National Recreation Area

Lake Mead, the centerpiece of the Lake Mead National Recreation Area (LMNRA) is located at the northern end of the River's lower portion and provides a setting for camping, fishing, boating, kayaking, hunting, and water-skiing. Similar recreational pursuits are found throughout the lower portion of the River, particularly on the other lakes formed by the dams on the river mainstem. LMNRA also extends further south from Hoover Dam to Davis Dam near Bullhead City, Arizona and includes Lake Mohave.

LMNRA receives approximately 10 million visitors annually. Typical water-based recreation activities that occur on Lake Mead include swimming, boating, houseboating, fishing, sailboarding, paddlecraft use, and scuba diving (USBR 1996b). On average, the majority of boats are personal watercraft. There may be as many as 6,000 boats combined on Lake Mead and Lake Mohave during a peak recreation use weekend. At Boulder Beach, which is located near the urbanized area of Las Vegas and surrounding communities, the personal watercraft percentage may be as high as 50 percent (USBR 2000).

Six marinas at Lake Mead provide boat launching facilities as well as slips and storage, fuel, and boat launches. In addition, there are three boat ramps without associated marinas and one site without a boat ramp. The marinas include Boulder Beach, Las Vegas Bay, Calville Bay, Echo Bay, Overton Beach, and Temple Bar. The boat ramps are located at Hemenway, Government Wash, and South Cove. Pearce Ferry has no boat ramp and is used as a take out by private and commercial boaters that kayak and raft the Colorado River into Lake Mead (USBR 2000).

Recreational boating is very popular at Lake Mead and the shoreline public use facilities are associated with boating use. Most of the facilities were designed to operate at full pool. However, the National Park Service has determined costs associated with adjusting facilities based on lowered lake elevations. These facilities are out of their normal operating range at pool elevations of 1180 feet msl, requiring sizable capital expenditures to restore them to working order. In addition, there are additional costs associated with any 20-foot drop below this level (USBR 2000).

The facilities above would be affected in specific ways at different pool elevations. At Las Vegas Bay, 1,190 feet msl was identified as an elevation at which facilities would require adjustment, but would continue to be operable. Elevation 1,180 feet msl was identified by the National Park Service as the elevation at which most other developed facilities would require capital expenditures, rather than just an adjustment, in order to maintain operation. Elevation 1,183 feet msl has been identified by the Hualapai Tribe as a threshold elevation for using the undeveloped Pearce Ferry site as a takeout for rafts and other whitewater boats. Therefore, 1183 feet msl is used as a representative threshold elevation for shoreline facilities and public access at Lake Mead (USBR 2000).

Other Recreational Opportunities

The next major lake downstream is Lake Havasu, formed behind Parker Dam. A multi-agency fishery enhancement program is underway to create artificial habitat to increase the game fish population, and additional shore access is being developed for fishermen. The waters of the lake also are used for water-skiing, speed boating, jet skiing, sailing, and canoeing. Camping and swimming also occur along the lake's shoreline. A number of campgrounds and marinas line the River and some offer boating and fishing facilities, picnic grounds, and swimming lagoons; other campgrounds are largely undeveloped. On the Arizona side of the river, there are three State parks—Lake Havasu State Park, Cattail Cove State Park, and Buckskin Mountain State Park—that are located in proximity to the lake. The southern portion of the river includes Imperial Reservoir, which is formed behind Imperial Dam.

A series of NWRs are also located along the lower portion of the Colorado River. These refuges provide opportunities for visitors to enjoy natural wildlife oriented recreation, such as wildlife observation, nature photography, hiking, fishing, and hunting. Special emphasis is directed towards migratory birds. Havasu NWR is located along Lake Havasu and includes the Topock Marsh area north of Lake Havasu City, Arizona. The Bill Williams NWR is located south of Lake Havasu City at the confluence of the Bill Williams River and the Colorado River. Cibola and Imperial NWRs are located between Blythe, California and Yuma, Arizona.

A number of recreational areas under the jurisdiction of the BLM also are located along or near the lower portion of the Colorado River. These include the Parker Strip Recreation Area, which is a narrow strip of land surrounding Lake Havasu. A backcountry byway follows the shore for 11 miles and is lined with scenic pullouts describing the importance of the River to the area's inhabitants. Recreational facilities include campgrounds, resorts, day use areas, picnic areas, launch ramps, fishing piers, and an off-highway vehicle (OHV) play area. Hiking, fishing, boating, swimming, and wildlife viewing are among the activities possible in this area. Other recreational areas include the Imperial Dam Long-Term Visitor Area, a 3,500-acre campground located north of Yuma; Betty's Kitchen and Interpretive Area, which includes a picnic area, interpretive trail, and fishing pier near Laguna Dam; the Mt. Nutt Wilderness, which is near Bullhead City; and the Warm Springs Wilderness Area, which is east of the Fort Mojave Indian Reservation.

Imperial Irrigation District

Imperial County is a popular recreational area for both water- and desert-based activities. Opportunities for recreation occur along the AAC and in the surrounding area, primarily on BLM lands. BLM-managed lands include the Imperial Sand Dunes Recreation Area, a 40-mile-long dune system. These dunes are managed for different uses: a portion consists of a popular OHV recreation area, and another portion contains two campgrounds. Other areas offer opportunities for solitude and a chance to view picturesque scenery and rare plants and animals. The OHV area is a major regional attraction. Three recreational vehicle (RV) camping parks are located near the Pilot Knob area, and five more are located near El Centro.

Fishing is permitted in IID canals and at three of its reservoirs. Swimming is prohibited in the canals. Water contact sports also are restricted near the mouth of the New River, which flows into the Salton Sea, because its water is considered a health hazard due to contamination from agricultural drains, wastewater treatment facilities, and unregulated discharge from Mexico.

Coachella Valley Water District

Many of the lands used for recreational purposes within the CVWD service area are under the jurisdiction of the BLM. These lands include the Coachella Valley Preserve, a system of sand dunes comprising a 20,000-acre sanctuary that is home to sensitive wildlife species and palm oases. Wildlife viewing is among the key attractions of this preserve. The Coachella Valley Preserve is also a prime location for wildlife observation, study, and photography. Hiking and horseback riding are permitted along specific trails. There are approximately 100 golf courses in the Coachella Valley and more are planned, although not all are located within the service area boundaries.

Some of the area along the Coachella Canal is bordered by sand dunes (the Sand Hills) and contains several private RV parks. Most of the canal is posted against trespassing by the CVWD because of the risk of drowning, but the canal attracts fishermen who use the canal illegally. Another important fishery is Lake Cahuilla, the terminal reservoir of the Coachella Canal. This 120-acre lake provides a public fishery managed by the Riverside County Parks Department and is stocked in part by the CDFG. The Lake Cahuilla Recreation Area is a popular campground with fishing, picnic grounds, hiking, and horseback riding.

Metropolitan Water District

The MWD service area covers portions of San Diego, Ventura, Los Angeles, Orange, San Bernardino, and Riverside Counties, which include large developed and undeveloped areas containing a wide variety of urban and natural recreational amenities. Large expanses of undeveloped land offer recreational opportunities such as camping, picnicking, hunting, boating, and fishing. Nature trails and fire roads traverse many of the more remote locations and are used by OHVs, mountain bike enthusiasts, equestrians, and hikers. Popular areas include Point Mugu State Park (Ventura County); Los Padres National Forest and Santa Monica Mountains National Recreation Area (Los Angeles County); Caspers Wilderness Park, Laguna Coast Wilderness Park, and portions of the Cleveland National Forest (Orange County); Chino Hills State Park (Orange County and San Bernardino County); and Maze Stone County Park, Lake Perris State Recreation Area (SRA), and portions of the San Bernardino National Forest (Riverside County). Regional, community, and neighborhood parks offer everything from mountain biking, equestrian activities, and hiking, to camping, boating, and fishing. Many facilities include sports fields and courts, nature centers, picnic areas, lakes, and streams.

San Diego County Water Authority

Much of the SDCWA service area is located within urbanized areas that contain a wide variety of recreational amenities. Nature trails and fire roads traverse many locations, including the Santa Margarita Mountains and Merriam Mountains, and are used by OHVs, mountain bike enthusiasts, equestrians, and hikers. Recreational opportunities such as camping and picnicking are available in areas such as the Agua Tibia Wilderness Area. Fishing and boating are offered at several inland locations such as Miramar Reservoir, Lake Ramona, Lake Wohlford, and Lake Hodges. Regional, community, and neighborhood parks offer everything from mountain biking, equestrian activities, and hiking, to camping, boating, and fishing. Many facilities include sports fields and courts, nature centers, picnic areas, lakes, and streams.

Batiquitos Lagoon, Buena Vista Lagoon, and several bays including San Diego and Mission Bays offer opportunities for observing birds and other wildlife. Many of the State beaches have fire rings, tide pools, and volleyball courts and are used for swimming, surfing, fishing, boating, and beach walking.

Salton Sea

Many recreational opportunities are available in the Salton Sea area, although many previously popular activities such as swimming, water-skiing, boat racing, and personal watercraft racing have declined considerably or are essentially non-existent due to water quality concerns and a lack of land-based facilities. Recreational uses near the northern shore of the Sea include hunting at private duck ponds located near the CVSC and offshore fishing and boating.

On the northeastern shore, the Sea frontage is almost entirely owned by the State of California and operated by the State Parks Department as the Salton Sea SRA. The park was built about 45 years ago when water levels were lower. During the late 1970s, water levels increased and flooded between one-quarter and one-half of the park. The campgrounds, harbor, and associated facilities subsequently were re-established outside of the flooded area. Recreational uses within this area include camping, RV camping, power boating, sailing, windsurfing, shore fishing, boat fishing, and sunbathing. Boat launching and mooring facilities are available at the five campgrounds in the area. Facilities associated with the North Shore Yacht Club and Marina, also located on the northeastern shore, are currently unused, and other private recreational facilities are in need of repair and/or non-operational. The rise in the Salton Sea's water level has created problems at some facilities, particularly with paving, picnic tables, and landscaped areas (USBR and SSA 2000).

The southern shore of the Sea contains such areas as the Imperial County Wildlife Area-Wister Unit and the Sonny Bono Salton Sea NWR. The types of recreational uses that occur in this area are strongly tied to the presence of wildlife and include hunting, fishing from the shore and boats, boating, and wildlife viewing. The western shore of the Sea contains recreational rental housing, RV camping, shore fishing, boating (four boat ramps are present), sunbathing, hiking, and bird watching. A number of closed and/or dilapidated resorts and restaurants are present in this area (USBR and SSA 2000).

3.5.2 Environmental Consequences

Impact Assessment Methodology

The actions that would result from implementation of the IA and QSA were evaluated to determine the extent to which they would impact existing recreational resources. The analysis considered whether these actions would diminish the quality of or preclude a recreational opportunity and draw on the findings of the water and biological resources sections. In the case of the Salton Sea, it is known that salinity impacts would continue to increase with or without the project, although at a somewhat slower rate. Therefore, impacts of the IA and QSA are measured against this projected baseline as well as the current baseline.

No-Action Alternative

No Action for Implementation Agreement

It is not anticipated that the No-Action Alternative would impact recreational resources with the exception of those of the Salton Sea. The detailed analysis of Salton Sea impacts can be found in the IID Water Conservation and Transfer Project EIR/EIS. As noted in section 3.1, the Salton Sea is expected to decline from its current elevation of about –227 feet to about elevation –235 feet over the 75-year study period (2002 – 2077) under the No-Action Alternative (i.e., no water transfers). This would reduce the amount of water area available for recreational uses. During the same period, salinity would continue to increase from its current 44,000 mg/l to about 86,000 mg/l. A significance threshold of 60,000 mg/l, beyond which fish are not expected to survive, would occur in about year 2023 (personal communication, P. Weghorst 2001). The increase in salinity would result in a substantive impact to sport fishing opportunities. The reduction in the Sea elevation would also substantively impact boat launching and mooring facilities once it receded below –230 feet since they would no longer have direct access to the water. Bird watching and waterfowl hunting also would likely decline since fewer birds would be present. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area.

No Action for Inadvertent Overrun and Payback Policy

Not adopting the IOP would have no impact to recreational resources.

No Action for Biological Conservation Measures

Not implementing the biological conservation measures would have no impact to recreational resources, but the benefits to passive recreational activities (such as birdwatching) related to the creation of new habitat along the Colorado River would not be realized.

Proposed Action

Implementation Agreement

COLORADO RIVER

No recreational impacts to the Colorado River area would result from the IA. The IA would not impact water quality perceptibly, nor would it substantially impact flow rate. The water level of the River would change slightly, but the change would be within the normal range of variability, and no recreational facilities, such as docks, would be impacted. Power boating, jet skiing, kayaking, and other water-oriented activities would be able to continue unimpeded. No substantive changes in the water level of the lakes that are fed by the River would occur. At Lake Powell, water elevations would change only slightly and would generally be higher under the IA than under the No-Action Alternative, and at Lake Mead, the differences would not be perceptible. No changes are anticipated that would impact any recreational activities that are dependent upon fish or wildlife.

IMPERIAL IRRIGATION DISTRICT

With implementation of the IA and QSA, IID would undertake water conservation measures in order to generate up to 300 KAFY for transfer. These measures would not cause a population increase in the IID service area and therefore would not increase the use of existing neighborhood and regional parks or other recreational facilities or result in their construction or expansion (see section 3.7, Socioeconomics). The proposed conservation measures would be located in remote farm areas well removed from recreational areas used by the public, and therefore would not impact recreational resources. Agricultural drains, which could be lined under the program, are not allowed to be used for public recreation, because they are on farmland and considered private property.

COACHELLA VALLEY WATER DISTRICT

Additional water made available to CVWD with implementation of the IA and QSA would not cause a population increase in the CVWD service area and therefore would not increase the use of existing neighborhood and regional parks or other recreational facilities or result in their construction or expansion (see section 3.7, Socioeconomics).

With implementation of the IA and QSA, flows to the CVSC would increase. Unauthorized swimming currently occurs here (the channel does not meet bacterial water quality standards for swimming) and fishing takes place in the lower channel where flows are higher. The increase in flows would have no substantive impact on the use of the channel for swimming with respect to water quality. With respect to fishing, fishes in the higher reaches may move further upstream with higher flows in the drains.

No change to the level of Lake Cahuilla water levels or water quality is expected as a result of the IA. Thus, there should be no impact on fish and fishing or any other recreational activities in the lake.

With implementation of the IA and QSA water transfers, CVWD would use canal water to water some golf courses instead of groundwater. Canal water has higher total dissolved salts content, which may require additional watering of bentgrass greens to flush salts out of the root zone of sensitive grasses, or consideration of separate piping for greens irrigation. The impact on area golf courses would not be substantial since few of them still have bentgrass greens because of their sensitivity to climate extremes.

Construction of pumping stations, pipelines, and recharge basins would be unlikely to impact recreational resources because they would probably be located in agricultural or remote areas; this potential will be evaluated in future site-specific environmental documents, however.

METROPOLITAN WATER DISTRICT

No construction would occur in this service area, nor would any operational changes that would cause the direct, substantial physical degradation of either public recreation uses or public recreational facilities, nor would an increase in recreational facilities result from the IA and QSA water transfers (which include water deliveries to Escondido, the Vista Irrigation

District, and the San Luis Rey Indian Water Rights Settlement Parties). No adverse impacts to recreational resources would occur.

SAN DIEGO COUNTY WATER AUTHORITY

No construction would occur in this service area, nor would any operational changes that would cause the direct, substantial physical degradation of either public recreation uses or public recreational facilities, nor would an increase in recreational facilities result from the IA and QSA water transfers. No adverse impacts to recreational resources would occur.

SALTON SEA

Upon implementation of the IA and QSA, IID would undertake conservation measures that would result in a decrease in inflow to the Sea, thus reducing its water level. Under the maximum impact scenario (200 KAFY to SDCWA and 100 KAFY to MWD), about 38,000 more acres of land would be exposed by 2035, and the Sea's vertical elevation would gradually drop to about –250 feet below msl (about 15 feet lower than under the No-Action Alternative). The decreased surface area of the Sea would reduce the area that could be used for water-based recreational activities such as fishing and boating, but this decrease is small in relation to the size of the area that would remain.

The newly exposed shoreline would be located primarily in the southern portion of the Sea. When water levels within the Salton Sea SRA dropped to 230 feet below msl, it would be necessary to relocate facilities such as Varner Harbor and campgrounds that are now located near the water (personal communication, S. Horvitz 2000). It also would be necessary to re-establish existing roads and trails that lead to the water, particularly in areas such as Mecca Beach, Sneaker Beach, and Old Camp. Decreasing water levels would expose footings and other remnants of the campgrounds that were covered when the water elevation increased during the late 1970s. These would have to be removed for safety as well as aesthetic considerations. Other public docks/launch facilities also may have to be relocated.

An acceleration of the increase in Sea salinity would result in an earlier decline of the sport fisheries and non-game fish of the Salton Sea than would occur under No Action. Under the maximum impact scenario (300 KAFY of conservation with all water transferred out of the valley), the Sea would reach salinity levels of 60,000 mg/l (the point at which fish are not expected to survive) about 11 years sooner than under No Action. The more rapid increase in salinity levels and loss of fish would reduce food sources for fish-eating bird populations sooner than without the project, and thus fish-eating bird populations would decline sooner. Sport-fishing, hunting, and bird and wildlife viewing would be adversely impacted. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area. Additional detail regarding these recreation-related impacts may be found in the IID Water Conservation and Transfer Project EIR/EIS.

Adoption of Inadvertent Overrun and Payback Policy

In the most extreme scenario, IOP overrun accounts totaling 331 KAFY could be owed to the Colorado River system. Both Lakes Mead and Powell could be impacted. Under this scenario, an elevation decrease as great as 2.5 feet could occur in Powell and 5 feet in Lake Mead. It should be stressed that this is the most extreme scenario anticipated, and would occur only infrequently, if at all. Assuming that the average account balance was owed to the system, Lake Powell elevation could drop as much as 9 inches and Lake Mead as much as 2 feet. The potential elevation change to these reservoirs from combined IOP and IA impacts is anticipated to be within the future normal fluctuation of the lakes and would not substantively impact docks, launch ramps, or other shoreline public use facilities. No other impacts to recreational resources are anticipated.

Implementation of Biological Conservation Measures

These measures would primarily impact recreational opportunities that are physically located near the Colorado River. Establishing additional habitat along the river would have a beneficial impact on passive recreational activities because it would add to the total acreage of wildlife and fish habitat along the Colorado River mainstem. The other measures would not be likely to impact recreational resources.

Mitigation Measures

IID developed the Salton Sea Conservation Strategy to mitigate impacts on the salinity of the Salton Sea that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. With implementation of the Salton Sea Conservation Strategy, the Sea would be maintained at elevations at or above the No Action condition until at least the year 2030. After that time, reduced inflow would cause the Sea to decline to about elevation -240 feet msl by the year 2077, compared to the No Action elevation of -235 feet msl. This would result in the exposure of land that has been inundated by the Sea. By maintaining suitable salinity conditions in the Sea, implementation of the Salton Sea Conservation Strategy would avoid impacts to sport fishery from increased salinity associated with the proposed action.

Recreational impacts related to lower Salton Sea water surface elevations could still occur after 2030. IID developed measures to mitigate impacts on recreational resources related to lower water surface elevations of the Salton Sea that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. If the decrease in the surface water elevation of the Salton Sea results in the exposure of public docks, launch ramps, or other public structures, thus precluding their intended use, then IID would provide funding for the relocation of public docks, launch ramps, or other public structures in proportion to the water elevation decrease that is attributable to the proposed action. The relocation of these facilities may be temporary and ongoing until the Sea reaches its minimum and stable elevation, at which point permanent facilities would be provided. If the decrease in the surface water elevation of the Salton Sea results in potential impacts to campgrounds and ancillary facilities, then IID would provide funding for the relocation of these facilities as the Sea declines to provide ongoing camping opportunities. The relocation of these facilities may be temporary and ongoing until the Sea reaches its minimum and stable elevation, at which point permanent facilities would be provided.

No other mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

This alternative would have similar impacts to the proposed action.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

3.6 AGRICULTURAL RESOURCES

3.6.1 Affected Environment

Regional Issues

Existing Agricultural Resources (California)

Table 3.6-1 presents the amount of agricultural land present in each California county served by IID, CVWD, MWD, and SDCWA and the percentage of land in each county that is in agricultural use. The categories included in Table 3.6-1 are defined in Table 3.6-2 and are based on the Important Farmland maps for California. These maps are compiled from USDA Natural Resources Conservation Service soil surveys and current land use information.

Table 3.6-1. Southern California Agricultural Land in 1998 by County (in acres)

County	*Important Farmland*[1]	*Grazing Land*	*Total Agricultural Land*[2]	*Urban & Built-Up Land*	*Total County Area*	*Agricultural Land as a Percentage of Total Land*
Imperial	554,889	0	554,889	23,952	2,868,426	19.3%
Los Angeles	57,292	218,118	275,410	159,533	2,529,470	10.9%
Orange	18,200	38,517	56,717	269,987	509,460	11.1%
Riverside	501,740	134,597	636,337	240,889	4,673,095	13.6%
San Bernardino	50,927	954,229	1,005,156	234,981	12,867,789	7.8%
San Diego	196,813	142,355	339,148	311,491	2,712,200	12.5%
Ventura	123,235	207,853	331,088	95,522	1,173,973	28.2%

Source: California Department of Conservation (CDC) 2000 a-g.

Notes: 1. Important Farmland includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland and Farmland of Local Importance.

2. This category includes both Important Farmland and Grazing land

Some agricultural land in Southern California is under Williamson Act contracts. Under the Williamson Act (formally referenced as the California Land Conservation Act of 1965), local governments may enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments that are much lower than normal because they are based upon farming and open space uses as opposed to full market value. Local governments receive an annual subvention of forgone property tax revenues from the State via the Open Space Subvention Act of 1971. The minimum term of a Williamson Act contract is 10 years.

IMPERIAL COUNTY

In 1998, agricultural land in Imperial County comprised 554,889 acres, or 19.3 percent of the county's total land area. All agricultural land in Imperial County is considered Important Farmland. Of the seven counties in Southern California, Imperial provides the largest amount of Important Farmland and the second largest percentage of agricultural land. In 1997, Imperial County was ranked as 10th in California in terms of agricultural production, with a value of $1,039,928,000 (personal communication, J. Tippett 2001). In 1998, Imperial County was the State's top producer of carrots (producing about 57 percent of the total statewide value), sugar beets (about 38 percent of the statewide value), onions (about 22 percent of the statewide value),

Table 3.6-2. Definitions of Categories Used in Important Farmland Maps

Farmland Category	*Definition*
Prime Farmland	Land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Farmland of Statewide Importance	This land is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to hold and store moisture. Farmland of Statewide Importance must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Unique Farmland	This is land of lesser quality soils used for the production of specific high economic value crops at some time during the two update cycles prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique farmland is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers.
Farmland of Local Importance	This is land of importance to the local agricultural economy and is determined by each county's Board of Supervisors and local advisory committees. Examples of this type of land could include dairies, dryland farming, aquaculture, and uncultivated areas with soils qualifying for Prime Farmland and Farmland of Statewide Importance.
Grazing Land	Grazing land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock.
Urban and Built-up Land	This is used for residential, industrial, commercial, construction, institutional, and public administrative purposes; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures; and other development purposes.
Other Land	Other land is that which is not included in any of the other mapping categories. The following types of land are generally included: low-density rural development; brush, timber, and other lands not suitable for livestock grazing; government lands not available for agricultural use; roads systems for freeway interchanges; vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development; confined livestock facilities of 10 or more acres; strip mines and borrow and gravel pits; a variety of other rural land uses.
Water	Water areas with an extent of at least 40 acres.

Source: CDC 2001.
Note: None of these categories include publicly owned lands for which there is an adopted policy preventing agricultural use.

wheat (about 19 percent of the total statewide value), alfalfa hay (about 17 percent of the statewide value), and sweet corn (about 17 percent of the statewide value). Imperial County also produces approximately 27 percent of the statewide value of cantaloupes, 22 percent of dates, and 18 percent of watermelons (California Department of Food and Agriculture 1998).

LOS ANGELES COUNTY

In 1998, Los Angeles County contained 275,410 acres of agricultural land, about 10.9 percent of the total land area in the county. Of the seven counties in Southern California, Los Angeles had the second lowest percentage of agricultural land, behind only San Bernardino County. Between 1992 and 1997, the market value of agricultural products sold increased by 19 percent to $237,665,000. Crops accounted for 94 percent of the market value, while livestock made up 6 percent (USDA 1997a). In 1997, Los Angeles County ranked 27th in the State in terms of market value of agricultural products. Los Angeles County's top five crops (by value) were ornamental trees and shrubs, bedding plants, dry onions, peaches, and carrots (California Department of Food and Agriculture 1997a).

ORANGE COUNTY

In 1998, agricultural land in Orange County comprised 56,717 acres, or 11.1 percent of the total land area in the county. Between 1992 and 1997, the market value of agricultural products sold increased 23 percent to $228,881,000, with crops and livestock accounting for 99 percent and 1 percent of the market value, respectively (USDA 1997b). In 1997, Orange County ranked 23rd in the State in terms of market value; its top five crops (by value) were nursery stock/flowers, strawberries, tomatoes, bell and miscellaneous peppers, and avocados (California Department of Food and Agriculture 1997b).

RIVERSIDE COUNTY

In 1998, agricultural land in Riverside County comprised 636,337 acres, or 13.6 percent of the county's total land area. Between 1992 and 1997, the total farmed land increased 20 percent (from 423,602 acres to 509,031 acres). During the same period, the market value of agricultural products sold increased by 24 percent to $1,047,525,000. Crops and livestock accounted for 55 and 45 percent of the market value, respectively (USDA 1997c). In 1997, Riverside County ranked 9th in the State in terms of market value. Its top five crops were milk, table grapes, eggs, nursery, and hay products (California Department of Food and Agriculture 1997c).

SAN BERNARDINO COUNTY

In 1998, agricultural land in San Bernardino County comprised 1,005,156 acres, or 7.8 percent of the county's total land area. San Bernardino had the largest amount of agricultural land of the seven Southern California counties, but also had the lowest proportion in relation to the total county area. Between 1992 and 1997, the market value of agricultural products sold increased by 9 percent to $617,833,000. Crops accounted for 12 percent of the market value, and livestock accounted for 88 percent (USDA 1997d). In 1997, San Bernardino County ranked 14th in the State in terms of market value of agricultural products. Its top five crops included milk, cattle and calves, eggs, hay/alfalfa and greenchop, and nursery stock (California Department of Food and Agriculture 1997d).

SAN DIEGO COUNTY

In 1998, agricultural land in San Diego County comprised 339,148 acres, or 12.5 percent of the county's total land area. Between 1992 and 1997, the market value of agricultural products sold increased by 27 percent to $1,139,276,000 (personal communication, J. Tippett 2001). Crops accounted for 87 percent of the market value, and livestock accounted for 13 percent (USDA 1997e). In 1997, San Diego County ranked 8th in the State in terms of market value of agricultural products. The top five crops were indoor decoratives, bedding and turf plants, avocados, trees and shrubs, and eggs (California Department of Food and Agriculture 1997e).

VENTURA COUNTY

In 1998, agricultural land in Ventura County comprised 331,088 acres, or 28.2 percent of the county's total land area. Of the seven counties in Southern California, Ventura contains the largest proportion of agricultural land. Between 1992 and 1997, the total land farmed in Ventura County increased by 8 percent, from 320,597 acres to 346,279 acres. During the same period, the market value of agricultural products sold increased by 9 percent to $942,267,000 (personal communication, J. Tippett 2001). Crops accounted for 98 percent of the market value and livestock accounted for 2 percent (USDA 1997f). In 1997, Ventura County ranked 11th statewide in terms of market value of agricultural products. Its top five crops were lemons, strawberries, nursery stock, celery, and Valencia oranges (California Department of Food and Agriculture 1997f). Ventura County is within the MWD service area, although no Colorado River water is used in Ventura County.

Agricultural Conversion in California

The loss of agricultural lands by conversion to other uses is a critical concern throughout California. Between 1994 and 1996, 45,641 acres of agricultural lands were converted to nonagricultural uses in Southern California, and the seven-county Southern California region trailed only the San Joaquin Valley in the amount of agricultural land converted to urban uses (CDC 2000a-g). Between 1996 and 1998, 56,306 acres of agricultural land were converted to nonagricultural use (CDC 2000a-g), which represents an 18.9 percent increase over the previous 2-year period. Table 3.6-3 outlines the net change in agricultural areas between 1996 and 1998 in Southern California. Between 1998 and 2000, an additional 20,000 acres were converted to nonagricultural use (no data are currently available for San Diego and Orange counties, and they are not included in this total) (CDC 2001).

Table 3.6-3. Net Change in Agricultural Lands between 1996 and 1998 (in acres)

County	*Change in amount of Agricultural Land*	*Percent Change in Agricultural Land*	*Change in amount of Urban & Built-out Land*	*Percent Change in Urban & Built-out Land*	*Agricultural Land Committed to Non-Agricultural Use in 1998*
Los Angeles	525	0.2%	3,873	2.5%	2,672
Orange	-2,472	-4.2%	7,740	3.0%	1,029
San Bernardino	-2,274	-0.2%	2,376	1.0%	15,716
Riverside	-6,556	-1.0%	8,902	3.8%	28,459
Imperial	-703	-0.1%	454	1.9%	data not available
San Diego	-1,635	-0.5%	4,322	1.4%	8,430
Ventura	-1,001		2,639	2.8%	7,740

Source: CDC 2000a-g.

Between 1996 and 1998, the amount of Prime Farmland converted to urban or built-up land in Southern California was approximately 5,244 acres (CDC 2000a-g) (1998 numbers are used since more current data are not available for all counties.) While Los Angeles County actually increased its Important Farmland base, the remainder of the counties in the region experienced sharp declines. Riverside County experienced the greatest net loss of agricultural land acreage and Orange County suffered the largest proportional decrease of its agricultural land base.

Existing Agricultural Resources (Western Arizona)

Agricultural resources in western Arizona are located in Mohave, La Paz, and Yuma Counties. Agricultural lands are located primarily along the Colorado River and in Yuma County along the Gila River Valley. While these three Arizona counties contain less than 6 percent of the land in farms in the entire State, they contain almost 32 percent of statewide irrigated harvested cropland. The three counties also contain 72 percent of the State's cultivation of vegetables, over 40 percent of hay and wheat cultivation, and over 36 percent of orchard lands. Table 3.6-4 provides a summary of agricultural lands within these counties.

Table 3.6-4. Western Arizona Agricultural Land in 1997 (in acres)

County	*Total Land in Farms*	*Total Cropland*	*Total Pastureland*	*Total County Area*	*Farmland as a Percentage of Total Land*
Mohave	997,171	18,635	860,551	8,465,280	11.8%
La Paz	278,854	121,826[1]	Not available	2,891,520	9.6%
Yuma	237,742	214,774	14,949	3,559,040	6.7%

[1] Estimated acreage; exact acreage not available
Source: Oregon State University 2001a, b, and c.

Agricultural Conversion in Western Arizona

The amount of land in western Arizona used as farmland has changed substantially during the past ten to 15 years (Table 3.6-5). Mohave County has experienced a significant reduction in farmland, primarily from a reduction in pastureland acreage. Yuma County has also experienced a reduction in farmland acreage, though the reduction is somewhat smaller in comparison. An exception to this trend has occurred in La Paz County. Farmland acreage in La Paz County has substantially increased during a recent 10-year period.

Table 3.6-5. Estimated Net Changes in Farmland Acreages in Western Arizona (in acres)

County	*1987 Farmland*	*1997 Farmland*	*Percentage Change*
Mohave	1,906,756	997,171	-47.8%
La Paz	226,954	278,854	+22.9%
Yuma	272,399	237,742	-12.8%

Source: Oregon State University 2001a, b, and c.

Existing Agricultural Resources (Southern Nevada)

Agricultural lands in Clark County, Nevada, are relatively limited in magnitude compared other farming areas in the project study area. Table 3.6-6 provides a summary of agricultural land in this county. A small proportion of this land is used for cropland, most of which is irrigated. Cropland is used primarily for producing hay, barley, and orchard crops. Cattle, poultry, and horses are the primary types of livestock produced in the county. Nursery and greenhouse crops are also produced in Clark County.

Table 3.6-6. Southern Nevada (Clark County) Agricultural Land in 1997 (in acres)

County	*Total Land in Farms*	*Total Cropland*	*Other Farmland*	*Total County Area*	*Farmland as a Percentage of Total Land*
Clark	70,741	9,108	61,633	5,120,000	1.4%

Source: U.S. Department of Agriculture, 2001.

Agricultural Conversion in Southern Nevada

Clark County has experienced a reduction in the amount of total farmland in recent years. Table 3.6-7 provides a summary of the change that occurred between 1992 and 1997. Much of this change can be attributed to the high rate of urban growth that is occurring in the county.

Table 3.6-7. Estimated Net Changes in Farmland Acreages in Southern Nevada (Clark County) (in acres)

County	*1992 Farmland*	*1997 Farmland*	*Percentage Change*
Clark	82,100	70,741	-13.8%
Source: U.S. Department of Agriculture, 2001			

Colorado River

The historic floodplain of the Colorado River is located within the eastern portions of San Bernardino, Riverside, and Imperial counties in California; the very western portions of Mohave, La Paz, and Yuma Counties in Arizona; and Clark County in Southern Nevada. In California, agricultural operations along the Colorado River are relatively small in magnitude compared to the western portions of these counties. In western Arizona, agricultural operations are primarily focused along the lands adjacent to the Colorado River and the Gila River. Agricultural lands in southern Nevada are not concentrated along the River but are scattered throughout different areas in Clark County.

Imperial Irrigation District

The IID service area is located entirely within Imperial County. The Imperial County region is a major agricultural area with one of the lowest agricultural land conversion rates in the State. Of all the Southern California counties affected by this project, Imperial County has the largest acreage of Important Farmland; the total county land area is composed of nearly 20 percent agricultural lands.

Coachella Valley Water District

The CVWD service area lies within the Coachella Valley, which is also a major agricultural area located primarily in Riverside County. Although the Coachella Valley is among the top five producers of artichokes, bell peppers, cantaloupes, honeydew melons, sweet corn, and watermelons (California Department of Food and Agriculture 1998) in California, it has also experienced considerable urbanization. Urban growth has contributed to Riverside County's having the largest amount of agricultural land used for nonagricultural purposes.

Metropolitan Water District

MWD serves the largest concentration of urban population in Southern California, including portions of Los Angeles and Orange Counties, southern Ventura County, the western portions of San Bernardino and Riverside Counties, and the western portion of San Diego County. This region is among the fastest growing urban areas in the State and has experienced substantial conversion of agricultural lands. Orange County has experienced the largest proportional loss of agricultural land and is among the top in urban and built-up land. Los Angeles County has actually experienced an increase in agricultural lands in production over the past two years.

San Diego County Water Authority

The SDCWA service area covers the western third of San Diego County. The county as a whole contains a large amount of agricultural land despite substantial urban growth. Approximately 12.5 percent of the county's land is devoted to agricultural uses, and its agricultural land conversion rate was below 1 percent between 1996 and 1998.

Salton Sea

A portion of the Salton Sea is located in the IID and CVWD service areas, which contain significant agricultural resources, as discussed above. The Salton Sea itself does not contain agricultural resources.

3.6.2 Environmental Consequences

Impact Assessment Methodology

The potential for impacts to agricultural resources were evaluated on a region-by-region basis to identify whether any of the potential changes resulting from the IA, IOP, or conservation measures would result in substantial adverse impacts to agricultural resources. These include the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to urban use or the substantial loss of farmland to urban use, conflicts with existing zoning for agricultural use, or conflicts with a Williamson Act contract (impacts in California only).

The following methodology was used to determine impacts of the IID water transfer within the IID service area (IID and USBR 2002).

The conservation program would be voluntary and, as such, the exact location of participating fields and the type of actual conservation measures employed could not be accurately predicted for this analysis. Depending on the location of specific improvements, the construction of on-farm or water delivery system improvements could convert lands within the IID water service area that historically have been in crop production to reservoirs, canals or other uses in support of on-farm irrigation system improvements or water delivery system improvements. Such changes in land use would not result in a classification change from agricultural to something other than agricultural. The changes would, therefore, not result in an impact to agricultural resources.

If fallowing were implemented as a conservation measure, land would be taken out of crop production on a rotational short-term basis, a long-term basis, or even permanently. Conserving water by fallowing could result in, or increase the probability of, agricultural land being converted to something other than agricultural production. To a great extent, the likelihood of fallowed land being converted to urban land use or other non-agricultural land uses would depend on the land's location and length of time it remains fallowed. Lands close to the boundaries of lands currently zoned for urban uses would have a higher probability of converting to non-agricultural land uses. Additionally, lands fallowed for extended periods of time would have a higher probability of being converted to something other than agricultural land use in part because of the cost of reclaiming crop lands that have not been cultivated or irrigated for extended periods. While proximity to urban land used or extended fallowing could make fallowed lands more attractive to development, conversion to a non-agricultural land use would require local approval of the change in zoning and is not part of the proposed action.

IID has indicated that there is the possibility that a fallowing program to conserve water for transfer could be implemented that would include permanent fallowing of croplands, and that fallowing for mitigation and/or to conserve water to meet IOP obligations would be limited to rotational fallowing. In this analysis, rotational fallowing indicates that a particular parcel of land would be removed from crop production for no more than three consecutive years. To identify the maximum potential impact to agricultural resources, the analysis assumes the worst-case scenario that all lands fallowed to conserve water for transfer would be permanently fallowed. To determine the maximum amount of impacted acreage for a voluntary program such as the proposed action, an average level of conservation (i.e., amount of water conserved) per fallowed acre is used. The per-acre conservation rate used in this analysis is 6 AF per fallowed acre.

The analysis of agricultural resources included the review of standards, regulations, and plans applicable to agricultural resources in the IID water service area. The potential for the proposed action and alternatives to result in changes to land use patterns of categorized and other farmland was evaluated to identify impacts.

No-Action Alternative

No Action for Implementation Agreement

Under this alternative, water use would have to be consistent with existing legal entitlements, although the manner in which this would occur is uncertain. The reliability of Colorado River water supplies would not be increased for CVWD, MWD, and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. If these measures do not effectively increase reliability, during drought years, extreme conservation measures or rationing might be required. This could impact the amount of water available for agricultural uses, if emergency water transfers with the agricultural sector are agreed to during drought years.

No Action for Inadvertent Overrun and Payback Policy

If the IOP were not adopted, Reclamation would enforce its obligations under the Decree, which may include reduced deliveries for those diverters that are projected to overrun based on their diversion rate and projected diversions for the remainder of the year, and/or cessation of deliveries for diverters that are at their entitlement amount. This could impact short-term productivity but would not have long-term impacts on agriculture and would not result in the loss of agricultural land or conflict with Williamson Act contracts.

No Action for Biological Conservation Measures

As described below, the implementation of biological conservation measures may result in conversion of agricultural lands to habitat; if these measures were not implemented, there would be no impact on agricultural resources.

Proposed Action

Implementation Agreement

COLORADO RIVER (INCLUDING SOUTHEASTERN CALIFORNIA, WESTERN ARIZONA, AND NEVADA)

Execution of the IA would not result in any changes in water supply, nor would it otherwise impact any agricultural land immediately adjacent to the Colorado River. It would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use or conflict with agricultural zoning or Williamson Act contract lands immediately adjacent to the Colorado River. Any changes in average river elevation resulting from execution of the IA would be minor and within current fluctuations and would not impact agricultural land. Therefore, no adverse impacts to agricultural resources would occur.

IMPERIAL IRRIGATION DISTRICT

With the exception of possible fallowing, no substantive impacts to agricultural resources would result from implementation of the IA and QSA. With implementation of these agreements, IID would reduce its diversions of Colorado River water at Imperial Dam for delivery to the IID service area. To compensate for this reduction, IID would implement a variety of on-farm conservation measures, such as tailwater return systems, water delivery system-based conservation measures (for example, new lateral interceptors, reservoirs, seepage interceptors, and conveyance lining), and land management techniques, such as fallowing, to ensure that agricultural water supplies would remain adequate. These measures are intended to allow the use of water in a more efficient and flexible manner and would not result in a substantive reduction in agricultural production, although these measures would result in a short- or long-term decrease in the amount of land farmed if fallowing were used.

With implementation of the IA and QSA, up to a total of 300 KAFY could be conserved for transfer through one or more conservation measures, including fallowing. If fallowing were used as a conservation measure, it could be either rotational fallowing or permanent fallowing or a combination of the two. Rotational fallowing would be consistent with planned land uses and would not result in the reclassification of any prime or statewide important farmlands; therefore, no impact to agricultural resources would occur. However, permanent fallowing of agricultural land could be used to conserve water for transfer; therefore, the worst case impact of the proposed action would be the permanent fallowing of up to about 50,000 acres of land. This represents up to about 11 percent of the total net acreage in agricultural production within the IID water service area. Assuming all acreage included in the water conservation program was permanently fallowed, and thus reclassified, this would represent an adverse, unavoidable impact to the agriculture resources of the IID water service area.

If fallowing is chosen as the exclusive method of water conservation, about 11 percent of the irrigated lands within the District could be fallowed. Execution of the IA would not convert Prime Farmland, Unique or Farmland of Statewide Importance to non-agricultural use or conflict with Williamson Act contract lands in Imperial Valley. A detailed analysis of IID's use of fallowing as a means to achieve water conservation under certain alternatives, indicates that potentially substantive unavoidable impacts to Farmland of Statewide Importance could occur.

COACHELLA VALLEY WATER DISTRICT

Execution of the IA would not have substantive impacts to agricultural resources within the Coachella Valley. The same quantity of water would be available for agricultural purposes, although the source would primarily be Colorado River water rather than a mix of Colorado River water and groundwater. The Colorado River water would be used to replace current groundwater use or for groundwater recharge. Colorado River water generally has a higher TDS concentration than Coachella Valley groundwater, and would require the application of additional water to some lands to leach salts from the soil. The additional water necessary to leach salts would be minimal, and water supplies for agricultural uses would remain adequate. Colorado River water contains relatively high concentrations of gypsum, which improves drainage on heavy or clayey soils, as well as relatively high percentages of calcium and magnesium compared to sodium, which is beneficial for infiltration and prevention of sodium build-up (Olson 1996).

Using the greater volumes of Colorado River water within the CVWD service area would involve the use of the current canal and distribution systems and potential expansion of those systems, including construction of pumping stations and other facilities. There would also be construction of recharge facilities for direct groundwater recharge. The precise location of these facilities is not known; however, their construction would not convert farmland to non-agricultural use. For example, spreading basins would be located on the edges of the valley in desert areas not generally used for agriculture. Prime soils generally have relatively low percolation rates, and would be avoided for spreading basins. Pipelines and pumping stations are common in agricultural areas, and any new pipelines and pumping stations would be located primarily in roadways or on the edges of agricultural fields. Some pipelines may cross agricultural fields, but this would impact the use of the agricultural area only temporarily and would not impact their designation as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The construction of these facilities would not conflict with property use, and therefore would not interfere with the provisions of a Williamson Act contract or be inconsistent with agricultural zoning.

METROPOLITAN WATER DISTRICT

No change to agricultural uses would occur within the MWD service area as a result of the IA, (which includes water deliveries to Escondido, the Vista Irrigation District, and the San Luis Rey Indian Water Rights Settlement Parties) because the amount of water available for agricultural use would not change, nor would any aspects of the program cause the conversion of farmland or otherwise impede the use of agricultural lands. No construction or other physical changes would occur; therefore, the program would in no way interfere with Willliamson Act contracts or conflict with agricultural zoning.

SAN DIEGO COUNTY WATER AUTHORITY

Execution of the IA would not result in a physical loss of agricultural lands since it involves operational changes to the Colorado River water delivery system with no physical changes within the SDCWA service area. The water being transferred to SDCWA replaces Colorado River water previously purchased from MWD. No change to agricultural uses within the SDCWA service area would occur as a result of the IA because the amount of water available for agricultural use would not change, nor would any aspects of the program cause the conversion of farmland or otherwise impede the use of agricultural lands. No construction or other physical changes would occur; therefore, the program would in no way interfere with Williamson Act contracts or conflict with agricultural zoning.

SALTON SEA

The Salton Sea itself does not contain agricultural resources, and the changes to Sea elevation and salinity that would occur as a result of the QSA would not impact nearby agricultural lands.

Adoption of Inadvertent Overrun and Payback Policy

The IOP would establish an administrative procedure for ensuring payback of water that is inadvertently used in excess of an entity's water entitlement. It would primarily impact agricultural uses in the IID and CVWD service areas (refer to section 3.1 for additional detail) and would not result in any permanent changes to water supply that would adversely impact agricultural resources in these service areas. This action would not convert Prime or Unique Farmland or Farmland of Statewide Importance to urban use, result in the loss of agricultural land, or conflict with Williamson Act contract lands.

It is estimated that under a worst-case scenario, CVWD and IID would be in payback about 44 percent of the time. The maximum payback would be 176 KAF in any given year, although the average payback would be between 48 and 71 KAF (depending on whether they were in a 3-year or 1-year payback condition). This amount is small compared to the total amount IID typically diverts each year. As indicated in section 3.1, from 1990 to 1999, IID's annual diversions of Colorado River water averaged 2,992.5 KAFY. CVWD's annual diversions are lower, averaging 330.9 KAF during this period.

Each district would be required to prepare a plan detailing how water would be paid back. Payback must come from measures above and beyond those taken to reduce the normal consumptive use of water (i.e., from actions taken to conserve water that otherwise would not return to the mainstream of the Colorado River). In the IID service area, this could include fallowing or supplementing Colorado River water supplies with non-system water supplies (groundwater or water banked off-stream that is not hydrologically connected to the Colorado River or its tributaries). Fallowing could have a short-term impact on agricultural productivity during payback years. Fallowing is a common practice in agricultural areas, and it would not otherwise impact agricultural resources. During payback years, CVWD would reduce the amount of water used for groundwater recharge, which would not impact agriculture.

Implementation of Biological Conservation Measures

Biological conservation measures would only have the potential to impact agricultural lands that are adjacent to the Colorado River mainstem. If the creation of backwaters or cottonwood-willow habitat occurred on Prime or Unique Farmland or Farmland of Statewide Importance, this would result in the removal of this land from agricultural production. The acreage proposed for habitat restoration is relatively small (up to 1,116 acres) as is the amount proposed for backwater creation (44 acres) and would not result in substantial reduction in agricultural production within California, Arizona, or Nevada. Williamson Act contract lands may also be impacted.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

Assuming all acreage included in the water conservation program was permanently fallowed, and thus reclassified, this would represent an adverse, unavoidable impact to the agriculture resources of the IID service area.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

Under this alternative, there would be no forgiveness for overruns occurring during flood control or space building releases. The maximum payback by IID and/or CVWD would still be 176 KAF in any given year, and the average payback would still be between 48 and 71 KAF. Impacts to agriculture would be generally comparable to those under the proposed action. Conservation measures would have to be implemented that could have short-term but adverse impacts on agricultural productivity. This action would not convert Prime Farmland or Farmland of Statewide Importance to non-agricultural use, result in the loss of agricultural land, or conflict with Williamson Act contract lands.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

3.7 SOCIOECONOMICS

Population, housing, and economic characteristics are described for portions of the States of Arizona, California, and Nevada. More specifically, the affected area is made up of counties in all three States that are within the Lower Basin of the Colorado River and counties in California that are included in the service areas of IID, CVWD, MWD, and SDCWA. The study area contains the following: Imperial, Los Angeles, Orange, Riverside, San Diego, San Bernardino, and Ventura Counties in California; La Paz, Mohave, and Yuma Counties in Arizona; and Clark County, Nevada.

3.7.1 Affected Environment

Regional Characteristics

Population

The population resident in each of the 11 counties comprising the study area in 1990 and 2000 is shown in Table 3.7-1. The large majority (almost 95 percent) of the regional population was located in the counties of Southern California in 1990 although this share fell slightly to 92 percent by 2000. Southern California historically has been one of the fastest growing areas in the State.

Growth in Southern California (and most of the State) historically has been attributable to natural population increase, in-migration from other States, and immigration from foreign countries. Natural increase (births minus deaths) generally accounts for 50 percent or more of California's growth in any given year. For example, in 1998-1999, natural population growth constituted 55 percent of the total increase. Foreign immigration makes up most of the remainder and generally remains more consistent in absolute numbers than in-migration from other States. During the recession of the mid-1990s, foreign immigration remained positive, while a strong domestic migration out of California created a net migration loss for the State (California Department of Finance [DOF] 2000). Despite this loss, California's population increased during this period. The non-coastal counties of Southern California experienced the highest rates of population growth during the decade of the 1990s. Riverside County saw its population grow at an average annual rate of 2.8 percent, while that of Imperial County grew at almost 2.7 percent annually.

The most rapid population growth rate occurred in Clark County, Nevada, which experienced an average annual rate of almost 6.4 percent. Such a growth rate describes a population doubling in just over 11 years.

While the populations of the Arizona counties are small compared to those in the California and Nevada counties, their growth rates in all cases exceed those of the California counties.

Over the coming decades the population is projected to increase at the most rapid rates in those counties that experienced the highest growth rates in the decade of the 1990s. The populations of both Imperial and Riverside Counties in California are projected to grow at rates in excess of 3 percent annually (see Table 3.7-2). Other counties forecast to grow relatively rapidly over the

Table 3.7-1. Population by County, 1990 and 2000

County	*1990*	*2000*	*Average Annual Percent Change (1990-2000)*
California	29,760,021	33,871,648	1.30%
Imperial	109,303	142,361	2.68%
Los Angeles	8,863,164	9,519,338	0.72%
Orange	2,410,556	2,846,289	1.68%
Riverside	1,170,413	1,545,387	2.82%
San Bernardino	1,418,380	1,709,434	1.88%
San Diego	2,498,016	2,813,833	1.20%
Ventura	669,016	753,197	1.19%
Percent of Region	***94.72%***	***91.87%***	
Arizona	3,665,228	5,130,632	3.42%
La Paz	13,844	19,715	3.60%
Mohave	93,497	155,032	5.19%
Yuma	106,895	160,026	4.12%
Percent of Region	***1.18%***	***1.59%***	
Nevada	1,201,833	1,998,257	5.22%
Clark	741,459	1,375,765	6.38%
Percent of Region	*4.10%*	*6.54%*	
Total Region	***18,094,543***	***21,040,377***	***1.52%***

Source: U.S. Department of Commerce, Census Bureau, Census of Population and Housing, 1990 and 2000.

Table 3.7-2. Population Projections by County, 2010 and 2020

County	*2000*	*2010*	*2020*	*Average Annual Percent Change (2000-2020)*
California				
Imperial	142,361	217,500	294,200	3.70%
Los Angeles	9,519,338	10,605,200	11,584,800	0.99%
Orange	2,846,289	3,266,700	3,541,700	1.10%
Riverside	1,545,387	2,159,700	2,817,600	3.05%
San Bernardino	1,709,434	2,231,600	2,800,900	2.50%
San Diego	2,813,833	3,388,400	3,863,500	1.60%
Ventura	753,197	877,400	1,007,200	1.46%
Arizona				
La Paz	19,715	25,096	29,078	1.96%
Mohave	155,032	194,403	236,396	2.13%
Yuma	160,026	171,689	209,861	1.36%
Nevada				
Clark	1,375,765	1,827,770	NA	2.88%[1]

Note: 1. Average Annual Percent Change is for 2000-2010.

Sources: Interim County Population Projections, California Department of Finance, Demographic Research Unit, June 2001. Arizona Department of Economic Security, Research Administration, Population Statistics Unit, February 1997 (http://www.de.state.az.us/links/economic/webpage/popweb/coproj97.html).

Nevada County Population Projections 2000 to 2010, June 2000. Nevada State Demographer's Office, University of Reno, Reno, Nevada.

period 2000 through 2020 are San Bernardino, California, La Paz and Mohave Counties in Arizona, and Clark County, Nevada.

Housing

Table 3.7-3 presents information describing the number of housing units in each of the counties in the study area for the years 1990 and 2000. Both the magnitude and rate of increase mirror the changes previously described for population. The size of the housing stock increased most rapidly in Clark County, Nevada followed by all of the counties in Arizona. The highest rates of change in the counties of California occurred in Imperial and Riverside Counties.

Table 3.7-3. Housing Units by County, 1990 and 2000

County	*1990*	*2000*	*Average Annual Percent Change (1990-2000)*
California			
Imperial	36,559	43,891	1.84%
Los Angeles	3,163,343	3,270,909	0.33%
Orange	875,072	969,484	1.03%
Riverside	483,847	584,674	1.91%
San Bernardino	542,332	601,369	1.04%
San Diego	946,240	1,040,149	0.95%
Ventura	228,478	251,712	0.97%
Arizona			
La Paz	10,182	15,133	4.04%
Mohave	50,822	80,062	4.65%
Yuma	46,541	74,140	4.77%
Nevada			
Clark	317,188	559,799	5.85%

Source: U.S. Department of Commerce, Census Bureau, Census of Population and Housing, 1990 and 2000.

The rate at which housing units were added to the existing stock on a year-by-year basis can be seen from the information presented in Table 3.7-4. Over the period of 1990 through 1999, almost 25,000 housing units were permitted for construction in Clark County, Nevada. This was more than double the next highest increase (Los Angeles County). This growth was all the more remarkable considering the base upon which the annual additions took place.

For the counties of California, new residential units authorized by building permits continued to grow throughout the late 1990s. However, as the region emerged from the recession of the early 1990s, the total number of permits issued in 1999 was almost 70 percent below the high point of the 1980s (SCAG 1999). As housing prices have increased in the employment centers in Los Angeles, Orange, and San Diego Counties, many workers have been excluded from home ownership and have opted for lower cost housing located on the urban fringe of Riverside and San Bernardino Counties.

Table

3.7-4 Residential Construction (units) by County, 1990-1999

1 pg. landscape

Virtually all counties in the study area, with the exception of Clark County, Nevada, experienced a sharp decline in residential construction activity in the first half of the 1990s. Building activity gradually increased after mid-decade and by 1999 had surpassed the 1990 level in the cases of Orange, San Diego, and Ventura Counties in California, and La Paz and Yuma Counties in Arizona. Construction activity in all other counties of the study area lagged behind their respective 1990 levels. The construction trend for Clark County differs significantly from other counties. Although the county experienced a downturn in the early 1990s, building activity started increasing by 1993.

Economics

Employment is one of the major indicators of a region's economic health. Table 3.7-5 shows employment trends for the counties of the study area for the years 1990, 1995, and 1999. All counties (with the exception of Los Angeles County) experienced overall growth in employment. The highest rate of change in employment occurred in Clark County, Nevada, followed by the counties of Arizona and Riverside, San Bernardino, and Imperial Counties in California.

Table 3.7-5. Full- and Part-Time Employment by County, 1990, 1995 and 1999

County	*1990*	*1995*	*1999*	*Average Annual Change (Percent) 1990-1999*
California				
Imperial	52,717	58,946	63,386	2.1%
Los Angeles	5,355,420	5,031,492	5,369,705	0.0%
Orange	1,579,956	1,576,278	1,801,299	1.5%
Riverside	455,999	514,253	618,974	3.5%
San Bernardino	555,616	595,171	687,891	2.4%
San Diego	1,438,146	1,453,667	1,664,791	1.6%
Ventura	329,642	355,31	390,770	1.9%
Arizona				
La Paz	5,876	6,704	7,337	2.5%
Mohave	37,269	44,320	51,803	3.7%
Yuma	51,145	59,902	67,112	3.1%
Nevada				
Clark	459,537	617,216	815,718	6.6%
Source: http://www.bea.doc.gov/bea/regional/reis				

Unemployment in Southern California has recently been at an all-time low. Since the recession in the early 1990s, the economy has diversified; as manufacturing jobs have been lost, new jobs have been created in information technology, entertainment, services, and apparel and fashion design (SANDAG 1998).

Agriculture plays an important economic role in the project area. Table 3.7-6 provides an overview of selected key economic variables in the counties where agriculture could be affected by the proposed action.

Table 3.7-6. Agricultural Data by County (1997)

	California			*Arizona*			*Nevada*
	Imperial	**Riverside**	**San Bernardino**	**La Paz**	**Mohave**	**Yuma**	**Clark**
Number of Farms	557	3,048	1,455	97	212	465	209
Land in Farms (acres)	489,726	509,031	924,015	278,854	997,171	237,742	70,741
Average farm size (ac.)	879	167	635	2,875	4,704	511	338
Market value of land and buildings per acre (dollars)	3,068	4,618	693	1,512	257	4,496	1,610
Market value of agricultural products sold ($1,000)	850,315	1,047,525	617,833	94,665	14,983	522,063	18,926
Average market value of agricultural products sold per farm (dollars)	1,526,662	343,676	424,628	975,925	70,674	1,122,717	90,557

Source: U.S. Department of Commerce, Census Bureau, Census of Agriculture, 1997.

Colorado River

The easternmost portions of Riverside, San Bernardino, and Imperial Counties border the west side of the Colorado River. The River also is bordered by La Paz, Mohave, and Yuma Counties in Arizona, and by Clark County in Nevada. These counties are growing in population, housing, and employment, as noted above. Areas surrounding the River primarily are used for recreation and agriculture or are in open space.

Imperial Irrigation District

IID is located in Imperial County, where farming is the main source of income. The Imperial Valley currently is undergoing steady growth in excess of the overall State growth rate. Like other agricultural counties in the State, Imperial County's employment growth has been relatively slow but is projected to increase by over 32 percent by 2020 (SCAG 1999).

Coachella Valley Water District

Most of the CVWD service area lies in Riverside County, but the district also extends into Imperial and San Diego Counties. Riverside County has been growing rapidly and is now the sixth most populous county in the State. The growth rate of population, housing, and employment in the Coachella Valley is projected to increase through the year 2010 and then start to decline between 2010 and 2020 (SCAG 1998). This service area contains a number of resorts as well as agricultural uses, both of which provide employment opportunities.

Metropolitan Water District

MWD provides wholesale water service to portions of Orange, Los Angeles, Ventura, San Diego, San Bernardino, and Riverside Counties. The region has the largest and fastest growing population and employment base in the State; Los Angeles and Orange Counties are two of California's largest counties. This service area has a diverse employment base.

San Diego County Water Authority

SDCWA is located in the western portion of San Diego County. San Diego population, employment, and housing projections show a continuation of current growth trends. This service area has a diverse employment base.

Salton Sea

The Salton Sea is located in Imperial and Riverside Counties. It is an important recreational and aesthetic resource, attracting visitors from both Southern California and throughout the United States, and it generates employment and tax revenues from tourism.

3.7.2 Environmental Consequences

Impact Assessment Methodology

Each project component was evaluated as to its potential to induce population growth and impact current or future population and housing projections. These components were also evaluated as to their potential to displace people, housing, or businesses or create other economic impacts on a local or regional scale.

The impact analysis for the IID service area is based on that performed for the IID Conservation and Transfer Project EIR/EIS (IID and USBR 2002). The methodology used to support the socioeconomic analysis of the IID Water Conservation and Transfer Project EIR/EIS is based on a regional economic model using the software and data package IMPLAN PRO. IMPLAN PRO is an input-output (I-O) model that estimates the total impacts to a regional economy of changes to local business conditions, expenditures, or employment levels. Economic changes were estimated and used as inputs to the IMPLAN PRO model, which predicts the total effects on the regional economy. The effect of the IID Water Conservation and Transfer Project on the regional economy was evaluated using: (1) changes in employment; and (2) the value of business output as the primary indicators.

Changes in business activity that would be caused by the IID Water Conservation and Transfer Project are attributed to one of the following three categories, which were individually modeled to estimate their impact on the regional economy:

- **Non-Agricultural Sectors** – Changes in local expenditures for goods, materials, and services associated with the construction, operation, maintenance, and replacement of on-farm and water delivery system improvements.
- **Transfer Revenue Expenditures** - Changes in the local expenditure of disposable income by farmers participating in the water conservation program.

- **Agricultural Production Sectors** - Reductions in agricultural output resulting from the fallowing of agricultural lands.

More detailed results of the impact analysis, including a breakdown of the total effect into the I-O components of direct, indirect, and induced effects, can be found in the IID Water Conservation and Transfer Project EIR/EIS. IMPLAN PRO takes into consideration annual changes in local expenditures and agricultural production during the quantification period.

No-Action Alternative

No Action for Implementation Agreement

Under the No-Action Alternative, California would be required to reduce its diversions of Colorado River water to its apportionment of 4.4 MAFY in a normal year. It is unknown precisely how California would achieve this reduction. The reliability of Colorado River water supplies for CVWD, MWD, and SDCWA would not increase, but these agencies would pursue all legal and engineering solutions feasible to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. SDCWA would continue to rely on MWD for supplemental imported water needs, continue to maximize local supplies (including water conservation), look for other water transfers, and take other actions to meet its statutory obligation to provide an adequate water supply for its member agencies serving the San Diego region. If water supplies were curtailed due to drought or other emergency condition, it is possible that the economy could suffer short-term adverse effects. The extent and nature of any potential loss of existing supplies and resulting impacts is speculative, but could involve temporary stabilization or reductions in population, employment, and housing. It is unlikely that long-term population, employment or housing trends would change significantly. The precise economic impacts would depend on future decisions and legal actions; impacts are likely to be negative, but they cannot be determined at this time.

The Salton Sea is expected to decline from its current elevation of about –227 feet msl to about elevation –235 feet msl over the 75-year study period (2002–2077) under the No-Action Alternative. During the same period, salinity would continue to increase from its current 44,000 mg/l to about 86,000 mg/l. A significant threshold of 60,000 mg/l, beyond which fish are not expected to survive, would occur in about year 2023 (personal communication, P. Weghorst, 2001). This would have negative impacts to the area's biological and recreational resources, which could adversely impact the local economy.

No Action for Inadvertent Overrun and Payback Policy

This alternative would not impact housing or population. Reclamation would enforce its obligations under the Decree, which may include reduced deliveries for those diverters that are projected to overrun based on their diversion rate and projected diversions for the remainder of the year, and/or stop deliveries for diverters that are at their entitlement amount. This could result in a short-term reduction in agricultural productivity, with associated economic impacts, in the IID service area, the extent of which is dependent upon the amount of water involved.

No Action for Biological Conservation Measures

No changes to housing, population, or economics would result from not implementing the biological conservation measures.

Proposed Action

Implementation Agreement

COLORADO RIVER

The slight decrease in water level between Parker and Imperial Dams would not be sufficient to adversely impact tourism or other economic activities. Implementing the IA would not impact population, housing, or employment in this area. No new homes or businesses would be constructed, nor would any infrastructure that could serve new residents. No program elements would displace people and/or housing or require the construction of replacement housing. No infrastructure that could serve increased population would be constructed in this area. There would, however, be an impact on the CRIT from reduced energy produced at Headgate Rock Dam (see section 3.3.3 for more details).IMPERIAL IRRIGATION DISTRICT

A number of implementation scenarios potentially could take place in the IID service area depending on the amount of water that is conserved, the manner in which it is conserved (on-farm and water delivery system improvements versus land fallowing), and the eventual destination (and transfer fees paid) of the transferred water. This analysis is based on the scenario that would cause the greatest adverse change to an environmental resource, which assumes that 300 KAFY of water would be conserved for transfer through fallowing. (Additional conservation by IID may be required for compliance with IID's Priority 3a cap on Colorado River water diversions.) It also assumes that the first 50 KAFY of water conserved under the IA and QSA would be transferred to CVWD rather than to MWD. Under the terms of the QSA, if CVWD purchased the first 50 KAFY of water from IID, IID would be paid a base price of $50 per AF. If CVWD purchased the second 50 KAFY of water from IID, IID would be paid a base price of $125 per AF. If CVWD did not purchase water from IID under the QSA, MWD could purchase the water at a base price of $125 per AF. Thus, Imperial County would receive less economic benefit if CVWD purchased the first 50 KAFY rather than MWD.

If the reduction in water use was accomplished solely through land fallowing, Imperial County could experience a net loss of 1,400 jobs, mostly in the agricultural sectors. Such a change would comprise just under 3 percent of the Year 2000 county employment level. Net agricultural sector job losses would total 1,300, representing about 12 percent of the total county agricultural employment. The net decrease in the value of business output is estimated to be $98 million. This represents approximately 2 percent of the estimated $4.8 billion total value of business output for Imperial County (IID and USBR 2002).

Implementing the IA would not involve the construction of new housing or businesses or the creation of roads or other infrastructure that could serve an increased population; nor would it displace people or housing in the IID service area. Water diversions by IID would be reduced as a result of the implementation of the IA, which provides for the transfer of the conserved water outside the IID service area. Water supplies are considered adequate to maintain the current level of agricultural productivity given the use of water conservation measures identified by IID. These water conservation measures are intended to allow for the use of water in a more efficient and flexible manner and are not anticipated to result in a substantive reduction in agricultural production. The proposed water conservation program would involve such elements as constructing reservoirs and irrigation systems and lining canals, but these facilities would be located in agricultural areas, and this minor amount of construction would not adversely impact population or housing.

COACHELLA VALLEY WATER DISTRICT

Implementing the IA would not involve the construction of new housing or businesses or the creation of roads or other infrastructure that could serve an increased population. The water supply to the CVWD service area would increase under the IA; however, the additional water would be used only to offset the existing groundwater overdraft. The increased water supply that would result from the IA is considered in the Draft CVWMP prepared by CVWD (CVWD 2000a), the specific purpose of which is to address and reduce basin overdraft (this project is described in Chapter 1 and section 3.1 of Chapter 3). Nevertheless, sufficient water is currently available in the Valley groundwater basins to meet the demands of the projected growth with or without the IA (CVWD 2000a). Therefore, the same rates, magnitudes, and distribution of growth would occur regardless of whether or not the IA was implemented.

Use of the water transferred as a result of the IA would require the construction of pipelines, pumping stations, and other facilities in the CVWD service area; but this would not displace any existing housing or people because pipelines would be buried in roadways, and recharge basins and pumping stations would be located in desert or agricultural areas. Because population trends would not change and since no impacts to agriculture would occur (see section 3.6), it is concluded that no aspects of the IA would adversely impact economics or housing.

METROPOLITAN WATER DISTRICT

Implementing the IA (which includes water deliveries to Escondido, the Vista Irrigation District, and the San Luis Rey settlement parties) would not impact population, housing, or employment in the MWD service area. No new homes or businesses would be constructed, nor would any infrastructure that could serve new residents. No elements of the agreement would result in the displacement of people and/or housing or require the construction of replacement housing. No infrastructure that could serve increased population would be constructed in this service area. Refer to section 3.3 for the analysis of potential economic impacts associated with hydroelectric power production.

The IA would ensure that the MWD service area has a greater likelihood of receiving reliable water supplies as the amount of water available to California from the Colorado River is reduced. No new delivery facilities are proposed as part of this project, however, and the capacity of the CRA is a limiting factor in the delivery of water from the Colorado River to the MWD service area. No changes in historic levels of aqueduct flows or expansion of aqueduct capacity are proposed as part of the IA. As noted above, the population of the MWD service area is projected to continue to increase. Since no new deliveries are proposed, no increase in the amount of water carried by the CRA would occur, and no expansion of aqueduct capacity is proposed as part of the IA, no change in population is projected to occur as a result of the IA.

SAN DIEGO COUNTY WATER AUTHORITY

Implementing the IA would not impact population, housing, or employment in the SDCWA service area. No new homes or businesses would be constructed, nor would any infrastructure that could serve new residents. No elements of the IA would result in the displacement of people and/or housing or require the construction of replacement housing. No infrastructure that could serve increased population would be constructed in this service area, nor would water supply be increased in order to accommodate growth. Under the IA, SDCWA effectively would obtain water supplies from IID that it previously purchased from MWD. An equivalent amount of water would be delivered to SDCWA through existing infrastructure in an exchange with MWD. The QSA would not involve additions or expansions to SDCWA's water delivery and storage system.

SALTON SEA

Implementing the IA would not impact population or housing in the Salton Sea area. No new homes or businesses would be constructed, nor would any infrastructure that could serve new residents. No elements of the agreement would result in the displacement of people and/or housing or require the construction of replacement housing. No infrastructure that could serve increased population would be constructed in this service area.

With implementation of the IA and QSA, IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change to a substantial reduction. Under most scenarios, the Salton Sea would shrink at a faster rate than under No Action, the water surface elevation would decline faster, and salinity would increase more quickly. These changes would impact the fisheries and other recreational resources of the Sea, which may indirectly impact employment opportunities in the area, and possibly lead to a reduction in population, depending on the severity of the impact. This potential loss of employment opportunities, while having social consequences, would not constitute a substantive change to the environment. It would, however, contribute to the intensity of the impacts to fisheries and recreational resources identified in sections 3.2 (Biological Resources) and 3.5 (Recreational Resources), respectively. Sections 3.2 and 3.5 describe mitigation measures that would minimize or avoid impacts from reduced inflows to the Salton Sea.

Adoption of Inadvertent Overrun and Payback Policy

The IOP is a policy that identifies inadvertent overruns, establishes procedures to account for inadvertent overruns, and defines subsequent payback requirements. As described in section 3.6, Agricultural Resources, this policy would impact agricultural uses in the IID service area. Payback must come from measures above and beyond the normal consumptive use of water, i.e., from actions taken to conserve water that otherwise would not return to the mainstream of the Colorado River. These measures could include fallowing in the IID service area, which could have a short-term impact on agricultural productivity, employment, and revenue during payback years. Given the comparatively small amount of water to be paid back (a maximum of

176 KAF), the overall impact would be minor. CVWD would likely reduce its recharge efforts during payback years, which would not impact the service area's economy. No aspects of the IOP would impact population or housing.

Implementation of Biological Conservation Measures

Implementation of these conservation measures would not impact population or housing since they would involve fish stocking or fish rearing or the conversion of non-native vegetation or agricultural land to habitat suitable for endangered species. No housing would be displaced or created, nor would any population changes occur. Constructing or restoring backwaters would create a small, short-term increase in employment opportunities, as would creating willow flycatcher habitat. The creation of this habitat could potentially result in the loss of between 372 and 1,116 acres of agricultural land, and the creation of backwaters could potentially result in the loss of 44 acres of agricultural land, depending on the site(s) selected. This could result in the loss of some agricultural employment opportunities. Approximately 30,000 persons are employed in agriculture in the counties that border the River (U.S. Department of Commerce, Bureau of Economic Analysis 2001), and the number of jobs that could be lost would be small in relation to the total number in the project area. The loss of revenue from the removal of up to 1,116 acres of land from production would have a minor impact on the local economy given the amount of land still in production (refer to Table 3.7-6). Any lands acquired for this purpose would be from willing sellers, and fair compensation would be provided pursuant to Federal regulations.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

This alternative would not impact housing or population. Impacts would be generally as described under the proposed action.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

3.8 ENVIRONMENTAL JUSTICE

In 1994, The President of the U.S. issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-income Populations. The objectives of the Executive Order include developing Federal agency implementation strategies, identifying minority and low-income populations where proposed Federal actions could have disproportionately high and adverse human health and environmental impacts, and encouraging the participation of minority and low-income populations in the NEPA process. For the proposed action, an analysis was performed to determine whether any of the impacts associated with this action would disproportionately affect low-income and minority populations.

3.8.1 Affected Environment

The project study area is a very large geographic region encompassing seven California counties, portions of three counties in Arizona, and a portion of Clark County, Nevada. Within the remaining project area, a number of direct and indirect effects would occur. The direct effects of the proposed action are limited to Federal actions and would occur along the lower portion of the Colorado River. The indirect impacts of this project are related to local actions and would be generated by non-Federal entities in California. Nevertheless, an evaluation of environmental justice impacts was conducted for the potential indirect project effects that could occur within the service areas of the participating agencies. This included the impacts from declining elevations of the Salton Sea caused by IID's water conservation actions, impacts from possible fallowing of lands within IID for water transfer, and impacts from CVWD's use of Colorado River water received pursuant to the IA. Information for analysis of these possible indirect effects was provided by the IID Water Conservation and Transfer EIR/EIS, or from information provided by CVWD. No environmental justice impacts would occur in the MWD or SDCWA service areas, since no new facilities or construction activities would occur in those areas. Lastly, no project impacts would occur within Clark County, Nevada. Therefore, no environmental justice impacts would occur in that portion of the project study area.

Colorado River

As noted in this EIS, the primary direct effects associated with the proposed action would occur on the lower portion of the Colorado River between Parker and Imperial Dams. This area is sparsely populated with several small towns; in particular, Parker, Arizona and Blythe, California. U.S. census data was used to identify the demographic characteristics of communities along this reach of the River.

Two types of data must be reviewed to evaluate environmental justice effects: minority populations and income levels. Information regarding minority populations for census tracts located along the study area was obtained from the recent 2000 census. For the three California and three Arizona counties data regarding minority populations were collected and reviewed for each census tract along the River. County-wide statistics were reviewed to determine the percentage of the population not classified as Caucasian and the percentage classified as Hispanic. Using the county average for comparison, each of the census tracts in the study area was evaluated to determine whether the minority and/or Hispanic population percentages were greater than the county average. If a census tract percentage exceeded the county average, the tract was evaluated for environmental justice effects based on its minority population. Figure 3.8-1 shows the locations of the census tracts that meet these criteria.

The second criterion for an environmental justice analysis is income. Income data is not yet available from the 2000 census; thus, 1990 data was used in the analysis. To determine the locations of low-income populations, the income data for each of the six counties was reviewed to determine the countywide percentage of households that have incomes below poverty levels. Then, the individual census tracts were evaluated to determine the percentage of households within the tract that have incomes below poverty levels. If a census tract percentage exceeded the county average, the tract was included in the analysis based on income levels. Figure 3.8-2 shows the locations of the census tracts that meet this criteria.

Imperial Irrigation District

Census data were collected for the IID water service area. The population in the IID water service area is approximately 51 percent racial minority, 76 percent Hispanic origin, and 24 percent low-income. In addition, some of the census tracts identified for the subregion area consist of tribal lands associated with the Quechan Indian Tribe (Fort Yuma Indian Reservation).

Farm laborers, which are a predominantly low-income, minority population group, also comprise a substantial component of the overall population demographics within the subregion. Due to lack of data, is it not possible to determine the exact racial and income characteristics of this affected population. It is, however, reasonable to assume that this affected population would probably have high percentages of minority (i.e., Hispanic) and low-income individuals.

Coachella Valley Water District

Based on the technical analysis performed in the IID Water Conservation and Transfer Project EIR/EIS, two high and adverse impacts could occur in the CVWD service area. With regard to the high and adverse impact on air quality as a result of the exposed Salton Sea shoreline, this impact is discussed below under the *Salton Sea*.

In addition to the air quality impact, the TDS content of drinking water in certain areas within the CVWD service area would exceed secondary (i.e., aesthetic) drinking water standards with implementation of the QSA water transfers. The approximate boundary of this high and adverse impact to drinking water was identified by CVWD as the boundaries of La Quinta, Bermuda Dunes, Thermal, Mecca, the Oasis Irrigation Area, and the Martinez Canyon and Dike 4 Recharge Sites. The affected population was determined to be approximately 30 percent racial minority, 38 percent Hispanic, and 21 percent low-income.

Salton Sea

There is a potentially high and adverse impact on air quality as a result of the exposed Salton Sea shoreline associated with the proposed project. For the purposes of this analysis, census data were collected for two impact areas: (Scenario 1) a 1-mile setback around the Sea from its existing shoreline to determine localized impacts; and (Scenario 2) the boundaries of the Salton Sea Air Basin to determine regional impacts. Under Scenario 1, the population affected by this potentially high and adverse impact is approximately 41 percent racial minority, 57 percent Hispanic, and 29 percent low-income. Under Scenario 2, the population affected by this potentially high and adverse impact is approximately 38 percent racial minority, 54 percent Hispanic, and 18 percent low-income.

3.8.2 Environmental Consequences

Impact Assessment Methodology

The direct environmental impacts associated with the proposed action and alternatives were evaluated based on their physical proximity to communities along the lower portion of the Colorado River that are classified as having high minority and low-income populations (Figures 3.8-1 and 3.8-2). The purpose of this evaluation is to determine whether these impacts would disproportionately affect minority and low-income areas. For indirect impacts in the IID, Salton Sea, and CVWD areas, a slightly different methodology was used, which involved first, identification of "high and adverse" impacts, and second, a review of the impacted population to determine if the impact was disproportionate. A detailed explanation of the methodology is included in the IID Water Conservation and Transfer Project EIR/EIS.

No-Action Alternative

No Action for Implementation Agreement

If the IA were not executed, hydrologic conditions would not change dramatically (refer to section 3.1). The changes that would occur would not produce physical conditions that would adversely or disproportionately impact low-income and minority populations. There would be no change to current river regulation regarding hydroelectric power and no impacts would occur.

No Action for Inadvertent Overrun and Payback Policy

If the IOP were not adopted, no payback mechanism would be set in place for inadvertent overuse of water. The Secretary would deliver water in accordance with existing laws. This would impact the operational flexibility of users with limited storage capability and those with highly variable demand patterns, but it would be applied to all water users with quantified entitlements. No impacts involving environmental justice would occur.

No Action for Biological Conservation Measures

No environmental justice impacts would result from not implementing the biological conservation measures, but none of the potential benefits associated with these conservation measures would be experienced by low-income and minority communities along the lower portion of the Colorado River.

Proposed Action

Implementation Agreement

COLORADO RIVER

The direct impact of the proposed execution of the IA would result in a slight lowering of the surface water elevation along the Colorado River between Parker and Imperial Dams. This change in surface water elevation would occur throughout this reach of the River, impacting each community in an approximately equal fashion. For this reason, the direct impacts on the environment resulting from the IA would not disproportionately impact any specific communities along the River, including communities that have been identified as having low-income and minority populations. As noted previously, the indirect project impacts are more wide ranging and would occur within the respective service areas for the water and irrigation districts that would benefit from or be impacted by implementation of the QSA.

There would be a potential reduction in power generated at several power plants located on the Colorado River between Parker and Imperial Dams. As noted in section 3.3, the IA water transfers would result in a reduction in power generation of about 5 percent at both Parker and Headgate Rock Dams. All users of this power would be impacted. Parker Dam power users include Federal projects, MWD, 25 firm electric contractors, and others who may purchase surplus energy. Power from Headgate is used by BIA for the benefit of the CRIT and other Indian Tribes. A reduction in power generation at Headgate could impact BIA's ability to meet future tribal energy demands. If this occurs, the reduced increment of power would have to be purchased on the open market. If the open market rate is higher than that charged by BIA, there would be an adverse economic impact to the CRIT and other Indian Tribes; however, the magnitude of that impact is unknown.

IMPERIAL IRRIGATION DISTRICT

The potential fallowing of agricultural land by IID to accomplish the water transfer would result in the loss of agricultural jobs. From a year 2000 level of 11,300 jobs in the farm production and services sectors, approximately 1,400 jobs would be lost under the worst-case scenario analyzed. With implementation of the IOP and Salton Sea Conservation Strategy (described in sections 3.1 and 3.2), approximately 290 and 750 additional agricultural sector jobs would be lost, respectively. The total job loss under the worst case scenario analyzed would be 2,440 jobs, which is approximately 22 percent of the total number of farm production and services sector jobs in Imperial County. This potential loss of jobs is well within the variation in farm employment that has occurred over the last 10 years. However, in recognition of the racial and income status of the population that would likely be affected by this loss of employment, this impact was considered to be potentially high and adverse.

Most of the jobs that would be lost as a result of the potential fallowing by IID are low-wage agricultural jobs. Due to lack of data, is it not possible to determine the exact racial and income characteristics of this affected population. It is, however, reasonable to assume that this affected population would probably have high percentages of minority (i.e., Hispanic) and low-income individuals. This employment impact can therefore be described as having a disproportionately high and adverse effect on minority and low-income populations.

Figure

3.8-1 Minority as a Percent of Population by Census Tract within the Project Survey Area

color

Figure

3.8-2 Population Below Poverty Level as a Percent of Total Population by Census Tract within the Project Survey Area

color

The IID Board will consider whether measures to mitigate socioeconomic and associated environmental justice impacts as a result of fallowing in the Imperial Valley are appropriate, when it considers whether to approve the Water Conservation and Transfer Project.

COACHELLA VALLEY WATER DISTRICT

In addition to the air quality impact along the Salton Sea mentioned below, the TDS content of drinking water in certain areas within the CVWD service area would exceed secondary (i.e., aesthetic) drinking water standards with implementation of the proposed action. As described in the IID Water Conservation and Transfer Project EIR/EIS, the affected population was determined to be approximately 34 percent racial minority[1], 45 percent Hispanic, and 15 percent low-income. None of these percentages cross the thresholds established for this environmental justice analysis for identification of a minority or low-income population. Consequently, this affected population cannot be described as minority or low-income. This drinking water impact, therefore, cannot be described as having a disproportionately high and adverse effect on a minority or low-income population.

SALTON SEA

Windblown dust from the exposed shoreline of the Salton Sea as a result of IID's water conservation could result in high and adverse air quality impacts, including the potential for health effects from toxic compounds in windblown PM_{10}. Implementation of the Salton Sea Conservation Strategy (described in sections 3.1 and 3.2) would maintain Salton Sea elevations at or above the No Action condition until at least the year 2030. After that time, IID has proposed a 4-step monitoring and mitigation plan to reduce significant PM_{10} emissions and incremental health effects (if any) from Salton Sea sediments exposed by their conservation actions (see section 3.11 for details). Nevertheless, because of the potential for interim impacts (between the time monitoring identifies a problem and implementation of the treatment) and uncertainty regarding the cost and feasibility of treatment options, it is concluded that air quality impacts would be significant and unavoidable.

Due to the complex nature of air dispersion patterns, the geographic extent of this potentially high and adverse impact could not be definitively identified. Consequently, two geographic areas were analyzed for the affected population analysis. Under Scenario 1 (a local scenario), the air quality impact was assumed to be greatest near the shoreline of the Salton Sea. GIS analysis was used to identify the racial and income characteristics of the population residing within a 1-mile buffer around the Salton Sea shoreline. Under Scenario 2 (a regional scenario), the air quality impact was assumed to be potentially high and adverse throughout the Salton Sea Air Basin. GIS analysis was used to identify the racial and income characteristics of the entire population residing within the Salton Sea Air Basin.

Under Scenario 1, the population affected by this potentially high and adverse impact is approximately 41 percent racial minority, 57 percent Hispanic, and 29 percent low-income.

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1. The Bureau of the Census defines Hispanic origin as an ethnicity and not a race. Consequently, a person of Hispanic origin may be of any race, and as such the Census reports these characteristics separately. The CEQ 1997 definition of Minority includes Hispanic origin along with other race categories. To prevent double counting when examining Minority Populations, this analysis reviews racial minorities separately from Hispanics.

Under Scenario 2, the population affected by this potentially high and adverse impact is approximately 38 percent racial minority, 54 percent Hispanic, and 18 percent low-income. Under both scenarios, the racial minority and low-income population percentages are below the thresholds established for this analysis (i.e., 50 percent and 37 percent, respectively). Conversely, under both scenarios, the Hispanic population percentages are above the Hispanic population threshold of 50 percent. Consequently, the affected population under both scenarios can be described as a Hispanic population, which under the CEQ 1997 definition is also a minority population. As the potentially high and adverse air quality impact resulting from the decline in Salton Sea levels is expected to be limited to the Salton Sea Air Basin, and as no other similar air quality impacts are expected in other parts of the study area, the affected population can be described as receiving an adverse impact that appreciably exceeds the magnitude of similar impacts occurring in other parts of the study area. This potential air quality impact can therefore be described as having a disproportionately high and adverse effect on a minority population (i.e., a Hispanic population).

Adoption of Inadvertent Overrun and Payback Policy

The IOP is an administrative process that has been developed to establish consequences for water users who inadvertently overuse their allocation of water from the Colorado River. This process would be equally applicable to all parties with quantified consumptive use settlements. The process cannot be applied to a diversion entitlement, because diversion contracts do not provide a quantified volume of use from which to measure the quantity of overrun and from which to monitor the payback. However, neither does the policy infringe on diversion entitlements. Parties with diversion entitlements seeking to utilize the IOP policy could undertake to work with Reclamation to alter their entitlement to a consumptive use contract, thereby providing sufficient technical basis to administer the IOP policy. Some PPRs, including the Federal establishment PPRs for Indian Tribes, have characteristics of both a diversion and a consumptive use entitlement. Those PPRs are defined as the lesser of a quantified diversion or the consumptive use required for irrigation of a quantified number of acres. A party with a diversion entitlement or an entitlement having characteristics of both a diversion and a consumptive use seeking to utilize the IOP could work with Reclamation to establish a technical basis for administration of the IOP.

Implementation of Biological Conservation Measures

The biological conservation measures would be implemented along the lower portion of the Colorado River. The only components with the potential for adverse environmental impacts are those involving construction of habitat restoration areas along the river, which have the potential for local short-term noise and air quality impacts. The locations of restoration sites have not yet been determined; however, the site locations would be determined based on hydrological and biological feasibility and the availability of the land. Because of the increased biological, aesthetic, and recreational values associated with habitat restoration, the primary impact of restoration activities would be beneficial. There would be no disproportionate impact on low-income and minority populations.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

A potential residual economic impact could occur if the reduction in power generation at Headgate results in a need for BIA to purchase power on the open market to meet tribal energy demands, and the open market power cost results in higher rates charged by BIA to the Tribes.

A potential disproportionately high and adverse effect on minority and low-income populations could occur from loss of low-wage agricultural jobs due to fallowing in the IID service area.

A potential disproportionately high and adverse effect on a minority population (i.e., a Hispanic population) could occur from potentially significant and unavoidable short-term and long-term impacts from dust emissions from the exposed Salton Sea shorelines.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

Impacts would be as described under the proposed action in section 3.8.2.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

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3.9 CULTURAL RESOURCES

Cultural resources include, but are not limited to, prehistoric and historic districts, sites, buildings, structures, objects, and landscapes, etc., of importance to the study or appreciation of history, archaeology, architecture, other scientific disciplines, and/or that are valued by a cultural group or community. Passage of the National Historic Preservation Act (NHPA) in 1966 established the Federal historic preservation program and made it the policy of the Federal government, in partnership with States, local governments, Indian tribes, and private organizations and individuals to preserve, protect, and manage cultural resources for "the inspiration and benefit of present and future generations" (16 U.S.C. 470-1, Section 2[3]). Section 101 of the NHPA authorized the Secretary to expand and maintain a National Register of Historic Places (National Register), and to establish criteria for the inclusion of cultural resources on the National Register. Cultural resources meeting one or more of the Secretary's criteria as found at 36 CFR 60.4 that have been found eligible for listing, or are listed on, the National Register, are referred to as "historic properties."

Section 106 of the NHPA of 1966, as amended, directs Federal agencies to take into account the effects of their actions on historic properties, and to afford the Advisory Council on Historic Preservation (Council) an opportunity to comment with respect to the effects of the undertaking. Implementing regulations for Section 106 of the NHPA are found at 36 CFR 800, and establish the process Federal agencies must follow when assessing the effects of a proposed action on historic properties.

Undertaking Determination

The first step in the Section 106 process is for the Agency Official to determine if a proposed action meets the definition of an undertaking, and if so, whether or not it is a type of activity that has the potential to cause effects to historic properties. "Undertaking" is defined at 36 CFR 800.16(y) as "....a project, activity, or program, funded in whole or in part under the direct or indirect jurisdiction of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license, or approval; and those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency." The proposed action being evaluated in this EIS is composed of three components: 1) execution of an IA; 2) development and adoption of an IOP; and 3) implementation of biological conservation measures agreed to by Reclamation and the FWS in the 2001 BO.

As described in more detail in Chapters 1 and 2 of this EIS, the Secretary is responsible for managing the delivery and administration of water to the Lower Division States of Arizona, California, and Nevada, and the Republic of Mexico. Within the framework provided by the Law of the River, the Secretary must approve any proposed changes in managing and administering the delivery of water from the River. Table 2.2-1 outlines the projects and programs identified in the QSA, and the component of the project or program constituting the IA Federal action. Table 2.2-1 also lists the associated NEPA and CEQA documents that have already been prepared, or are in the process of being prepared, for the various projects and programs identified in the QSA. Potential effects to historic properties in the IID, CVWD, MWD, and SDCWA service areas that might result from actions subsequently carried out by these agencies have been, or are being addressed in these documents, and the Salton Sea Restoration Project EIS/EIR, so will not be considered further here. With the exception of the QSA PEIR, what these environmental documents do not address are the potential effects to historic properties located along the Colorado River that might result from the transfer of Colorado River water between the different parties to the QSA.

Implementation of the various projects and programs outlined in the IA could result in an estimated change in point of diversion of up to 388 KAF of Colorado River water. Agreements between IID, CVWD, SDWCA, and MWD specify that an amount of water equivalent to the amount of water conserved as a result of the implementation of various conservation projects and programs by IID and CVWD would be made available to SDWCA, MWD, and/or CVWD. In order for an amount of water equivalent to the amount conserved to be made available to users identified in the individual agreements and the QSA, it will be necessary for the Secretary, through Reclamation, to approve a change in the point of delivery of the water. The proposed Federal action resulting from execution of an IA is thus, Reclamation approval of a change in the point of delivery of up to 388 KAF of Colorado River water from its current point of delivery at Imperial Dam, upstream to Parker Dam. Because Secretarial approval is necessary, Reclamation has determined changing the point of delivery of water constitutes an undertaking as defined at 36 CFR 800.16(y). In accordance with 36 CFR 800.3(a) Reclamation has further determined that approval of a change in the point of delivery of a relatively large volume of water to a point upstream of its current delivery point, is a type of action having the potential to cause effects to historic properties because it is likely there would be a drop in River surface elevations between the two points. Execution of an IA approving a change in the point of delivery of the cited volume of conserved Colorado River water is thus an undertaking requiring further analysis and consultation to assess potential effects to historic properties, per the requirements of Section 106 of the NHPA.

Implementation of the QSA is conditioned upon development and adoption of a policy to address inadvertent overruns (i.e., the IOP must be in place before various actions identified in the QSA can be implemented). An inadvertent overrun is considered to be Colorado River water diverted, pumped, or received by an entitlement holder in excess of that user's yearly entitlement, and that is deemed to be beyond the control of the water user. The IOP defines how inadvertent overruns would be identified, the procedures that would be used to account for inadvertent overruns, and the requirements for subsequent "payback" of the water. Maximum inadvertent overrun accounts for individual entitlement holders would be set at 10 percent of the user's normal year consumptive use entitlement. Reclamation has determined adoption of an IOP meets the definition of an undertaking as defined at 36 CFR 800.16(y) as it can be argued that it creates a new activity or program (payback of water) to be administered by Reclamation that would become part of the on-going operation of the Colorado River.

In the ROD for development and implementation of ISG, Reclamation committed to enter into consultation under Section 110 of the NHPA with State Historic Preservation Officers (SHPOs) in Arizona, California, and Nevada, the Council, and other interested parties, concerning how its on-going operation of the lower portion of the Colorado River might be affecting historic properties. Modeling runs conducted as a part of the process of assessing the effects of the IOP indicate there would be changes in reservoir elevation and river flows, but these would be minor and well within historic operational parameters. This being the case, were an IOP to be put in place, any effects to historic properties resulting from its adoption would be indistinguishable from those that might be occurring as a result of on-going River operations. Thus, while Reclamation considers development and adoption of an IOP to be an undertaking with potential to cause effects to historic properties requiring further consultation under Section 106 of the NHPA, Reclamation has determined assessment of the potential effects of adoption of an IOP would be best considered within the broader framework provided by the Section 110 consultation effort it has committed to conduct covering all activities involved in its on-going operation of the lower portion of the Colorado River. Reclamation is actively in the process of collecting information concerning how its operation of the lower portion of the Colorado River may be affecting historic properties for presentation to the parties that will be involved in this consultation effort. Consequently, potential effects to historic properties that might occur as a result of adoption of an IOP and other activities involved in the on-going operation of the River can only be addressed generally as a part of the present analysis.

The FWS January 2001 BO for actions covered by the IA identifies several conservation measures to be implemented by Reclamation. At least two of these (restoration or creation of 44 acres of backwaters, and restoration of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River between Parker and Imperial Dams) could involve surface disturbing activities that might cause effects to historic properties, if any are present. At this time Reclamation has not selected specific locations where the identified conservation measures would be implemented. Because specific plans and locations for implementation of the conservation measures are not currently available, potential effects to historic properties that might result from their implementation can only be generally addressed as a part of the present analysis. Additional NEPA compliance including full assessment of potential effects to historic properties would be conducted, as appropriate, when Reclamation begins developing site-specific plans for implementation of the conservation measures identified in the BO.

3.9.1 Affected Environment

Definition of the Area of Potential Effects

The "area of potential effects" (APE) of an undertaking is defined at 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." This section goes on to state "the [APE] is influenced by the scale of the undertaking and may be different for different kinds of effects cause (sic) by the undertaking." As indicated above, the current action being evaluated in this EIS is composed of three related Federal actions. While these actions are related by virtue of their association with elements of the QSA, the geographic area within which effects might occur to historic properties would be different for each action.

As discussed above, the Federal undertaking resulting from execution of an IA is Reclamation approval of a change in the point of delivery of up to 400 KAF of conserved Colorado River water, from Imperial Dam upstream to Parker Dam. If approved, the volume of water flowing along the reach of the River between Parker and Imperial Dams would be reduced, which would likely result in a lowering of the surface elevation of the River in some areas. Where not confined by rocky canyon walls along this reach, the Colorado River winds its way through broad valleys. For the most part, where the River passes through the valleys, it has been channelized, and/or is confined within levees. In some locations, connected and disconnected backwaters and marshy areas supporting stands of riparian vegetation punctuate a landscape otherwise characterized by intensive agricultural development. For the purpose of assessing effects to historic properties that might occur as a result of the approval of the proposed change in the point of delivery, Reclamation has defined the length of the APE for this action to be the reach of the Colorado River between Parker and Imperial Dams, a distance of approximately 143 river miles. The width of the IA APE is here defined as the River channel from bank to bank, and the lateral extent of backwaters, lakes, and marshy areas having a direct connection to the River.

Adoption of an IOP would add another element to be considered in Reclamation's on-going operation of the lower portion of the Colorado River. As indicated above, Reclamation has previously committed to enter into a Section 110 consultation with the Arizona, California, and Nevada SHPOs, the Council, and other interested parties, concerning how its on-going operation of the lower portion of the Colorado River may be affecting historic properties. As a part of this consultation effort, Reclamation will seek and consider the views of all parties on how the APE for River operations should be defined and will work with the parties to determine if there are reaches along the River and around the reservoirs that might be eliminated from inclusion in the APE because they are being operated or managed in accordance with planning documents for which previous Section 106 or Section 110 consultation has been completed, etc. Reclamation thus here defers definition of an APE for adoption of an IOP to the Section 110 consultation process it has previously committed to conduct concerning its on-going operation of the lower portion of the Colorado River.

Specific locations have not been selected for implementation of the biological conservation measures identified in the FWS January 2001 BO. Restoration or creation of 44 acres of backwaters, and restoration of up to 1,116 acres of southwestern willow flycatcher habitat would require a reliable source of water, so it is reasonable to assume that implementation of the conservation measures would be restricted to one or more as yet to be identified areas on the historic floodplain of the Colorado River between Parker and Imperial Dams. Because each project associated with implementation of the conservation measures would be subject to site-specific environmental and Section 106 compliance prior to project initiation, the potential for the occurrence of cultural resources on the historic floodplain is addressed only generally below.

Identification Effort and Results

Reclamation has determined that, at this time, the appropriate level of the identification effort for each of the actions being assessed here is a Class I inventory. Reclamation, FWS, and MWD are in the process of preparing an EIS/EIR assessing the potential effects to the environment that might occur as a result of development and implementation of the Lower Colorado River MSCP. The MSCP will serve as a coordinated, comprehensive approach to habitat management along the lower portion of the Colorado River from Lake Mead downstream to the SIB. As a part of the effort to assess the potential effects of the MSCP, Reclamation contracted with Archaeological Consulting Services (ACS), Inc., to prepare a Class I overview for areas in and around Lakes Mead, Mohave, and Havasu; the lower reaches of the Virgin and Bill Williams Rivers; and those portions of the historic floodplain of the Colorado River between Davis Dam and the SIB where conservation actions associated with the MSCP are likely to occur. The MSCP APE encompasses all of the IA APE, and some portion of the area that will likely be included in the APE for the Section 110 consultation on River operations. The APEs for the biological conservation measures associated with the IA are probably encompassed by the MSCP APE, but the actual relationship between the two is not clear at this time.

The MSCP Class I inventory report (Clark, et al., n.d.) is still in draft form, and is unavailable for public distribution. Information concerning historic features that might be present, and site and project data pertinent to the IA APE has been extracted from the MSCP Class I inventory report and is presented and evaluated in the following section. Because the APEs for the Section 110 consultation on River operations and implementation of the biological conservation measures associated with the IA remain to be defined, it is not possible at this time to extract information from the MSCP Class I inventory report relevant to these actions. As a result only general observations concerning cultural resources that might be present in the as yet to be defined APEs for these actions can be offered below.

Cultural Resources In the IA APE

Site and project information pertinent to the IA APE was obtained by ACS from the following agencies and repositories: Reclamation's Lower Colorado Regional Office in Boulder City, Nevada; Arizona State Museum (ASM); the Arizona SHPO; and the Eastern Information Center, the San Bernardino Archaeological Information Center, and the Southeast Information Center in Riverside, Redlands, and Ocotillo, California, respectively. Very little cultural resource inventory has been performed within the boundaries of the IA APE, which is not at all surprising considering the vast majority of the area is permanently or periodically inundated, and when covered by water is not amenable to direct inspection using traditional pedestrian survey techniques. Inspection of USGS 7.5' quadrangles showing the locations of cultural resource inventories that have been conducted on the historic floodplain of the Colorado River between Parker and Imperial Dams, indicates the boundaries of survey polygons located in the immediate vicinity of the IA APE typically coincide with the boundary of the APE (i.e., the boundaries of the surveyed areas usually terminate at the edge of the River channel, or a connected backwater, lake, or marsh). All total, approximately 75 acres have been inventoried to Class III standards within or along the edge of the IA APE.

As a part of the records search for the MSCP Class I, ACS was asked to examine Government Land Office (GLO) township survey plats on file at Bureau of Land Management State Offices in Arizona, California, and Nevada, to determine the kinds of historic cultural features that might be encountered within the MSCP APE. A total of 54 cultural resources were identified on GLO plats covering the area of the IA APE (see Table 3.9-1 for listing). The majority of these (n=38) consist of linear features such as ditches (n=2); a piece of the Atchison, Topeka, and Santa Fe Railway where it crosses the Colorado River; two (2) "highway" segments; eight (8) fence lines, including a portion of a "fenced field"; several segments of roads and trails (n=14 and n=9, respectively), including three identified as "Indian trail[s]"; a segment of the Cibola Canal; and a part of the Parker to Blythe telephone line. Structures identified on GLO township plats include a "shack"; a "hut"; a well, a corral; three houses; two ranches; and a "hotel," "cabins," and other unidentified structures in the vicinity of Norton's Landing. The IA APE also transects several desert land claim parcels identified on the plats. No field reconnaissance was undertaken to determine if there are physical remains of the cultural features present at the locations identified on the GLO plats. Given that the locations of some of these features (e.g., the "hotel" and "cabins" at Norton's Landing) fall in the River channel or connected lakes or backwaters when plotted on more recent USGS 7.5' quadrangles, it is likely some, if not many of the identified cultural features, have been destroyed by meandering or relocation of the River channel and agricultural development that occurred in the area subsequent to the GLO township surveys.

A search of site records on file at the various repositories cited above, indicates 56 sites are present in or are located immediately adjacent to the boundary of the IA APE (Table 3.9-2). This number is deceiving, however. There are no data except for a map plot for twelve sites. Another 29 sites are GLO point plots. Apparently, at some point in the past, staff at the Southeast Information Center obtained copies of GLO surveyors' notes used to construct GLO township plats for lands in

Table

3.9-1 Cultural Features Shown on Government Land Office (GLO) Township Survey Plats that May be Located in the Implementation Agreement Area of Potential Effect

4 pages

Table

3.9-2 Cultural Resources Located Within or Adjacent to the Implementation Agreements Area of Potential Effect

4 pages

Imperial County. Using these notes, repository staff seem to have plotted a point on more recent USGS 7.5' quadrangles where GLO surveyors indicated a cultural feature such as a road, trail, ditch, etc., intersected a township grid line. A permanent site number was then assigned to the point. Of the 29 GLO point plots in the site records, at least 17 appear to correspond to resources identified during the examination of GLO township plat maps described above. There is nothing in the site records for these 29 resources to suggest any field reconnaissance has ever been performed to confirm the presence of physical remains of cultural features at the plotted locations. Consequently, these 29 "sites," like the GLO resources discussed above, are best viewed as being suggestive of the kinds of historic features that *might be* present within the IA APE.

Of the remaining 15 sites, only three are located in the IA APE. These include Parker Dam, considered to be a contributing element to the Parker Dam Historic District which has recently been found eligible for listing on the National Register in consultation with the California CSHPO; CA-SBR-4371H, the alignment of the "Old Parker Road;" and Imperial Dam, potentially eligible for individual listing on the National Register, and considered to be a contributing element to the All-American Canal system. The remaining twelve sites are located proximate to (i.e., the boundary of the site as plotted on repository maps was coincident with the outer boundary of the IA APE), but not in the IA APE. These sites include: a segment of the Atchison, Topeka & Santa Fe Parker Cutoff (CA-SBR-9853H) where it crosses over the Colorado River on a bridge north of Parker, Arizona; CA-RIV-783, a scatter of ceramics and heat altered rock described as an "ethnobotanical camp," situated on a terrace above the River near Walter's Camp; CA-RIV-1109/CA-RIV-419, two intaglios located on a "mesa top" above the River that are apparently part of the Quien Sabe site complex; AZ R:6:11 (ASM)/BLM 02-050-037, for which no site form is available, but appears to denote a bridge over the River north of Ehrenberg, Arizona; AZ R:14:16 (ASM) and AZ R:14:17 (ASM), both of which are historic mining/milling features situated in elevated locations overlooking the River; CA-IMP-7092, the Cuckoo Mortars Sites, described as consisting of three bedrock mortar depressions on a rocky point jutting into a lake; 4-IMP-5898H, a natural cavern converted into a jail, and considered one of the last features associated with the historic gold milling community of Picacho; 4-IMP-5871H, a multi-component site described as a lithic scatter with a cleared circle, a segment of a trail, and historic mining claim cairns, on a bluff overlooking the River; AZ-050-1643, a rock art site on the upper slope of a bluff overlooking the River; 050-347, a prehistoric site with two cleared circles on a terrace above Martinez Lake; and X:3:13 (ASM), a prehistoric habitation site sitting on a high point near the edge of the IA APE, which has been listed on the National Register.

In summary, very little Class III cultural resources inventory has been conducted in the area covered by the IA APE, most likely because lands within the APE are permanently or periodically inundated. GLO township plats and repository site records suggest numerous, mostly linear, historic resources *may be* present in and around the IA APE, but no attempts have been made to confirm that there are physical remains at the cited locations. It is likely many of the cultural features identified on the GLO township plats have been destroyed by meandering and relocation of the main channel of the Colorado River and agricultural development that has occurred in the area since the maps were prepared. Few sites have been formally recorded on the historic floodplain of the lower portion of the Colorado River between Parker and Imperial Dams in general, and only a small number of these fall within the IA APE. Twelve sites have been recorded in locations proximate to the boundary of the IA APE, at least one of which, X:13:3, is listed on the National Register. Only three sites are located in the IA APE, including Parker and Imperial Dams, considered to be contributing elements to the Parker Dam Historic District and the AAC system, respectively, and CA-SBR-4371H which consists of a portion of the alignment of the "Old Parker Road."

Cultural Resources in the IOP APE

As discussed above, modeling runs indicate if an IOP were to be adopted, the effects on reservoir elevations and river flows would be minor and well within the historical parameters of Reclamation's operation of the lower portion of the Colorado River, and thus would be indistinguishable from effects occurring as a result of on-going River operations. In the ROD for development and implementation of ISG, Reclamation committed to enter into consultation under Section 110 of the NHPA, with SHPOs in Arizona, California, and Nevada, the Council, and other interested parties, concerning how its on-going operation of the lower portion of the Colorado River might be affecting historic properties. Effects that might result from adoption of an IOP then, are best considered within the larger framework provided by the Section 110 consultation for on-going operation of the lower portion of the Colorado River. The APE for this consultation effort has yet to be defined by the consulting parties, so only general statements can be made at this time concerning cultural resources likely to occur in areas along the River corridor.

The lower portion of the Colorado River is now, as it certainly was in the past, a reliable water source supporting lush stands of vegetation, and a wide variety of fish, birds, and other wildlife. Valleys and canyons along the course of the River are veritable oases in an otherwise harsh desert, and there is little doubt they have been inhabited since Late Pleistocene times. Definitive evidence for continuous occupation of the floodplain and rocky canyons along the Colorado River is lacking, however. Archaeological research in the area in general has been hampered by a lack of stratified sites and sites containing datable materials, and as a result, much of what is known of the sequence and character of the cultural groups that occupied the region during the prehistoric period, has been extrapolated from surrounding and more distant areas whose culture histories are better known. Current understanding of the prehistoric occupation along the lower portion of the Colorado River is summarized in a number of sources including Altschul et al. (1994), Cordell (1984), Ezzo (1994), Ezzo and Altschul (1993), Huber and Ezzo (1995), McGuire and Schiffer (1982), Sterner and Bischoff (1997), and Stone (1991); the interested reader is referred to these works for detailed information concerning the prehistory of the region, and for information concerning historic themes, research questions, and data requirements pertinent to understanding and evaluating cultural resources found in the area. For general summaries concerning historic period exploration and settlement of the area, the reader is referred to Hague (1978), Sterner and Bischoff (1997), Stone (1991), and Warren et al. (1991). Tribes with traditional and historic ties to the reach of the Colorado River from Hoover Dam/Lake Mead area to the SIB include the Southern Paiute, Hualapai, Mojave, CRIT, Chemehuevi, Yavapai, Quechan, Cocopah, Hopi, Zuni, and Navajo tribes. Summaries of ethnographic information concerning these and other Southwestern and Great Basin tribes can be found in Ortiz (1983) and D'Azevedo (1986), respectively.

Examination of project distribution maps accompanying the MSCP Class I inventory draft report (Clark et al., n.d.) indicates numerous Class III inventories have been conducted around the lakes and along the corridor of the lower portion of the Colorado River. For the most part, these inventories have been limited in scope, covering only a small percentage of the total land area. Survey coverage is generally spotty, with a tendency for inventories to be concentrated in the vicinity of developed recreation areas and other facilities around the lakes, and in areas around population centers and recreation areas along the River corridor, with little inventory occurring in intervening areas. While numerous inventories have been conducted in upland areas along the River corridor, Class III inventory of locations on the historic floodplain has been extremely limited.

Hundreds of prehistoric and historic sites have been documented around the lakes and along the River corridor. Examination of maps and site forms accompanying the LCR MSCP draft Class I inventory report (Clark, et al, n.d.) indicates Class III inventories in upland areas bordering the historic floodplain of the Colorado River have resulted in the identification of numerous prehistoric sites. In contrast, Class III inventories performed on the historic floodplain seem rarely to result in the identification of prehistoric or historic cultural resources. In general, historic site distribution along the River corridor appears to be more random, with sites occurring in a variety of environmental and geomorphological contexts. It is not possible at this time to provide generalized statements concerning the distribution of sites located in the vicinity of Lakes Mead, Mohave, and Havasu, as Reclamation is currently in the process of gathering and evaluating information relating to cultural resources located in these areas.

Cultural Resources in the Biological Conservation Measures APE

Restoration or creation of 44 acres of backwaters, and restoration of up to 1,116 acres of southwestern willow flycatcher habitat would require a reliable source of water, so it is reasonable to assume that implementation of the conservation measures would be restricted to one or more as yet to be identified areas on the historic floodplain of the Colorado River between Parker and Imperial Dams. Few Class III inventories have been performed on the historic floodplain along this reach of the River, and only rarely have they resulted in the identification of prehistoric or historic cultural resources.

Lack of extensive Class III inventory coverage of areas on the historic floodplain of the Colorado River is one likely explanation for the extremely low numbers of documented prehistoric and historic sites in the area. However, the results of recent research conducted in the vicinity of Yuma, Arizona, suggest an alternative explanation that is worthy of testing in other areas along the River. The Colorado River drains a vast watershed covering portions of seven States. Prior to construction of Hoover Dam in the 1930s, discharge rates along the River varied seasonally, averaging 20,000 cfs with peak flows in excess of 200,000 cfs, making the River extremely dynamic and unpredictable in its behavior. Examination of historic maps during archival work conducted in association with a series of cultural resource inventories near Yuma (i.e., Bischoff et al., 1998; Huber et al., 1998a, Huber et al., 1998b; Sterner and Bischoff 1998), indicated the River altered its course several times between the 1840s and 1950s, in one case meandering 2 miles across its floodplain. Geomorphological evaluation of trenches on the floodplain in areas behind the modern levees consistently revealed the presence of sedimentary deposits characteristic of a high-energy fluvial environment (Bischoff and Sterner 1998; Huber et al., 1998a and 1998b). Sediments laid down under high-energy fluvial conditions are extremely unlikely to contain *in situ* cultural remains. Inventory of several parcels on the historic floodplain of the Colorado River was also revealing. Only recent trash was found on parcels located inside the levee system, while the earliest cultural materials identified on parcels outside but in close proximity to the levees, post-dated levee construction. Prehistoric cultural remains recorded during the inventories were confined to locations on the first terrace above the historic floodplain. The results of these inventories suggest there should be few prehistoric sites or historic sites on the historic floodplain of the Colorado River that will pre-date the construction of Hoover, Davis, and Parker Dams, and/or local levee systems.

How applicable the results of the Yuma inventories might be to other areas along the River remains to be tested, however.

3.9.2 Environmental Consequences

Impact Assessment Methodology

The methodology for assessing impacts to cultural resources is described above in sections 3.9 and 3.9.1.

No-Action Alternative

No Action for Implementation Agreement

If the IA is not implemented, the changes in deliveries of Colorado River water and the flow changes between Parker Dam and Imperial Dam would not occur. Flows in the Colorado River would continue as they do today, characterized by a wide range in flows. Project-related impacts to cultural resources would not occur.

No Action for Inadvertent Overrun and Payback Policy

The IOP would not be implemented and the additional variability in water flows would not occur; therefore, impacts to cultural resources would not occur.

No Action for Biological Conservation Measures

The biological conservation measures would not be implemented and any associated impacts to cultural resources would not occur.

Proposed Action

Implementation Agreement

Approval of a change in the point of delivery of up to 388 KAF of conserved Colorado River water annually, from Imperial Dam upstream to Parker Dam, would reduce the volume of water flowing between the two dams. A decrease in flow volume could lead to a concomitant lowering of stream surface elevation. There are several potential consequences of lowering the surface elevation of a stream. If the drop in surface elevation is significant and is sustained for some months or years, there could be changes in depositional/erosional processes along the lower reaches of tributary streams and washes. Small deltas are often created where tributary streams or washes come into confluence with a higher order stream. If surface elevation of the higher ordered stream is lowered significantly and maintained for some time, the tributary stream or wash will cut through its delta, and perhaps headward along its lower reach, until it again attains equilibrium with the higher order stream. In such cases, the probability historic properties would be impacted is extremely remote, as recent deltaic deposits and fluvial sands and gravels deposited along the lower reaches of a tributary stream or wash, are unlikely to contain *in situ* cultural materials. Riparian and marsh resources are important to many Native American tribes, and other cultural groups. A decrease in stream surface elevation could result in a lowering of the water table in some areas, which might impact stands of riparian vegetation fringing the stream. A decrease in surface elevation of a stream might also result in a reduction in the surface area of connected backwaters, lakes, and marshes, increasing or decreasing, as the case might be, access to historic properties in nearby areas. Whether or not such impacts would occur, and how far they might extend beyond the channel of the stream would be largely dependent on the magnitude and duration of the drop in surface elevation.

In association with preparation of the Interim Surplus Criteria (now referred to as Guidelines) EIS, Reclamation performed an analysis to obtain hydraulic data at 20 locations along the Colorado River between Parker Dam and Imperial Dam. The results of this modeling are given in Table A-1 in the BA (Appendix D). Further information on the computation of effects to water surface elevation are given in Appendix J. Typically, a river will respond to a change in flow conditions through depositional or erosive processes. However, there is virtually no possibility that these processes would affect any historic properties. It is highly unlikely that there are any *in situ* cultural materials present in the bed sediments of the Colorado River channel or in the recent deltaic sand and gravel deposits at the mouths of and along the lower reaches of tributary streams and washes.

Groundwater levels are predicted to drop 0.4 feet or less (FWS 2001), which has the potential to impact riparian vegetation with shallow roots along the outward fringe of the riparian zone. Deeply rooted plants would not be impacted. However, only eight percent of the total riparian vegetation is relatively undisturbed native riparian woodland. Cottonwood and willow trees as well as marsh vegetation are more susceptible to lowering of groundwater levels than are other riparian plants such as mesquite, salt cedar, and arrow weed (USBR 2000a). The biological conservation measures incorporated as part of the proposed action are intended to serve as mitigation for this impact.

The surface areas of open backwaters and backwaters with emergent vegetation fluctuate on a seasonal basis. Decreasing flow volume by about 388 KAF per annum would result in decreases in the number of acres of open backwaters and backwaters with emergent vegetation. All reductions are within historical ranges, however, so are unlikely to result in any substantive impacts. Projected decreases in acreage figures for open backwaters and backwaters with emergent vegetation are within the historic size range for seasonal reduction in the acreage of these features. Reclamation has determined there would be no impacts to riparian or other riverine resources of traditional importance to Native Americans or other communities as a result of a change in the point of delivery of up to 388 KAF of Colorado River water from Imperial Dam upstream to Parker Dam.

No new surface disturbance would occur as a result of the approval in the change of the point of delivery. No alterations to existing dam facilities, canals, or levee structures would be needed to accommodate predicted changes in flow volume. Thus, there would be no impact to Parker Dam or Imperial Dam. Furthermore, there would be no impact to the remaining segments of the “Old Parker Road” (CA-SBR-4371H) located in the IA APE.

Site X:3:13 (ASM), a prehistoric habitation site listed on the National Register, is located on a high point bordering the IA APE. This site would not be directly impacted by any drop in river surface elevation. Information on the site form suggests that this high point can be accessed from the landward side at some points during the year by crossing a marshy area. If these windows of access were to increase in number or duration, this could result in an increase in site visitation. Site X:3:13 is located in the area represented by the three southernmost profile points in Tables A-1, A-3, A-6, and A-7 in Appendix D (i.e., the data collection points located at river miles 56.0, 53.6, and 50.8). From this data, it has been determined that the anticipated changes to the water surface elevation would not result in an increase in the number or the duration of times during the year when X:3:13 can be accessed. As a result, Reclamation has determined there would be no indirect impacts to X:3:13 resulting from execution of the IA.

Eleven other sites are located proximate to, but not in the IA APE (see discussion in section 3.9.1). Descriptions of the locations of these sites on the site forms, along with their locations as plotted on USGS 7.5′ quadrangles, indicate that all are situate in elevation locations (e.g., on terraces, bluffs, rocky points, etc.) overlooking the Colorado River or a connected lake or backwater, so they would not be directly impacted by execution of the IA. The changes in water surface elevation would not likely result in any increase or decrease in access to these sites from the river. Given this, Reclamation has determined that there would be no indirect impacts to any of the eleven other sites located proximate to the boundary of the IA APE.

Taking all of the above into consideration, Reclamation finds there would be no adverse impact to historic properties as a result of the execution of an IA approving a change in the point of delivery of up to 388 KAF of Colorado River water from its current point of delivery at Imperial Dam, upstream to Parker Dam.

Adoption of an Inadvertent Overrun and Payback Policy

As discussed above, if an IOP were to be adopted, the potential impacts to cultural resources would be indistinguishable from those associated with on-going operation of the lower portion of the Colorado River. As a result, Reclamation has determined the potential impacts to historic properties that might result from adoption of an IOP would be best evaluated within the broader context of all operations of the lower portion of the Colorado River. In the ROD for development and implementation of ISG, Reclamation committed to enter into consultation under Section 110 of the NHPA, with SHPOs in Arizona, California, and Nevada, the Council, and other interested parties concerning how its on-going operation of the lower portion of the Colorado River might be impacting historic properties. As a part of this effort Reclamation will seek and consider the views of all the consulting parties with respect to the impacts of its ongoing operation of the lower portion of the Colorado River. Reclamation thus herein defers assessment of the potential impacts to historic properties that might result from the adoption of an IOP to this larger Section 110 consultation effort.

Implementation of Biological Conservation Measures

Specific locations have yet to be identified for implementation of the biological conservation measures associated with execution of the IA; thus, it is not possible at this time to assess the impacts of these actions on historic properties. As noted above, specific projects would most likely be located on the historic floodplain of the Colorado River where very few sites have been documented. It is not clear at this time if the low number of recorded sites is a function of the lack of intensive inventory, the dynamic and unpredictable character of the River and its meanderings, or some combination of the two. As specific locations are identified and planning begins for implementation of the biological conservation measures, each project would be subject to individual NEPA compliance and Section 106 consultation. Reclamation thus herein defers assessment of the impacts of the implementation of biological conservation measures associated with execution of an IA to these future consultation efforts.

Mitigation Measures

IMPLEMENTATION AGREEMENT

At this time, Reclamation does not perceive a need to develop mitigation measures specific to historic properties for this action. Reclamation will request concurrence from the Arizona and California SHPOs on its finding of no impact to historic properties resulting from execution of an IA, and will consider their views with respect to development of such measures. If it is determined mitigation measures are necessary to protect historic properties, they will be identified in the final EIS for this action.

<To be revised before FEIS>

ADOPTION OF AN INADVERTENT OVERRUN AND PAYBACK POLICY

Reclamation has deferred consideration of the impacts of adoption of an IA to the Section 110 consultation it has previously committed to conduct evaluating the impacts of its on-going operation of the lower portion of the Colorado River on historic properties. As a part of this consultation Reclamation will seek and consider the views of the consulting parties on how best to manage and mitigate for impacts that might be occurring to historic properties as a result of ongoing operations. Consequently, no mitigation measures are proposed herein for this action.

IMPLEMENTATION OF BIOLOGICAL CONSERVATION MEASURES

All actions associated with implementation of biological conservation measures related to execution of an IA would be subject to individual NEPA compliance and Section 106 consultation. Project-specific mitigation measures would be developed as a part of these future consultations, as necessary. Reclamation recommends here that detailed archival research to identify and evaluate historic relocations of the River channel, and geomorphological investigations (e.g., aerial photo evaluation; trenching, and description and interpretation of exposed sediments, etc.) be included as a part of the cultural resource inventories that would be performed in association with the development and implementation of these projects.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Release Alternative

Impacts to cultural resources would be the same as the proposed IOP. Potential impacts to cultural resources would be indistinguishable from those associated with the ongoing operation of the lower portion of the Colorado River.

Mitigation Measures

The approach to mitigation would be the same as described above under the proposed IOP.

Residual Impacts

No residual impacts would occur.

3.10 TRIBAL RESOURCES

3.10.1 Affected Environment

Introduction

This section outlines potential impacts to tribal resources associated with the implementation of the proposed action. Tribal resources include all potential impacts to tribal lands and resources, including the specific category referred to as Indian Trust Assets (ITAs). ITAs are legal assets associated with rights or property held in trust by the U.S. for the benefit of federally recognized Indian Tribes or individuals. The U.S., as trustee, is responsible for protecting and maintaining rights reserved by, or granted to, Indian Tribes or individuals by treaties, statutes, and executive orders. All Federal bureaus and agencies share a duty to act responsibly to protect and maintain ITAs. In accordance with Environmental Compliance Memorandum (ECM) 97-2, Reclamation's policy is to protect ITAs from impacts resulting from its programs and activities whenever possible. Reclamation, in cooperation with Tribe(s) potentially impacted by a given project, must inventory and evaluate assets, and then mitigate, or compensate, for impacts to the asset. While most ITAs are located on a reservation, they can also be located off-reservation. Examples of ITAs include lands, minerals, water rights, and hunting and fishing rights. ITAs include property in which a Tribe has legal interest. For example, tribal entitlements to Colorado River water rights established in each of the Basin States pursuant to water rights settlements are considered trust assets, although the reservations of these Tribes may or may not be located along the River. A Tribe may also have other off-reservation interests and concerns that must be taken into account.

Reclamation sent a memorandum to 55 Indian Tribal representatives on April 26, 2001, inviting them to enter into government-to-government coordination pursuant to CEQ regulations for implementing the procedural provisions of NEPA (40 C.F.R. Part 1501); the National Historic Preservation Act; and Executive Order 13175 of November 6, 2000, pertaining to consultation and coordination with Indian tribal governments. The Tribes contacted were those along the LCR and other Tribes within the project region of influence in California and Arizona. Reclamation met with CRIT staff to discuss potential impacts to the CRIT from the proposed action, and provided a grant to CRIT for technical assistance in review of hydropower impacts from reductions in Colorado River flow below Parker Dam. At CRIT's request, a formal government-to-government consultation meeting will not occur until after this review has been completed. Reclamation and FWS have also met with the Torres Martinez Band of Cahuilla Indians on a government-to-government basis regarding potential impacts to the Tribe's resources.

The proposed Federal action has the potential to directly affect ITAs along the Colorado River. Indirect effects related to local actions that would be generated by non-Federal entities in California, such as conservation measures undertaken to conserve water to be transferred, are outside the control of Reclamation. Nevertheless, an evaluation of ITA impacts was conducted for the potential effects (specifically groundwater impacts) that could occur, which mainly affect

California Indian tribes along the Salton Sea or within the CVWD service area. This analysis is based on information available from CVWD regarding their planned use of water made available from the IA. CVWD is preparing a separate Program EIR on its Water Management Plan that will address the groundwater impacts in more detail.

Based on meetings and discussions among the Tribes, BIA, and Reclamation staff, the following describes all tribal resources (i.e., ITAs, water quality, biological resources, land uses, cultural resources, and hydroelectric power generation) that have the potential to be directly or indirectly impacted by the proposed Federal action. A description of tribal entities within the project study area and resources affecting multiple Tribes along the lower Colorado River are provided below.

Tribal Entities Along the Lower Colorado River

Fort Mojave Indian Tribe

The Fort Mojave Indian Reservation is located in the Lower Basin of the Colorado River where Nevada, Arizona, and California meet. The Tribe possesses PPRs from the mainstem of the Colorado River in all three of the States that contain reservation land, pursuant to the Decree and supplemental Decrees (1979, 1984, and 2000). Since the original Decree was entered in 1964, 1,570 acres of land have been added to the reservation, including 1,102 acres in Arizona and 468 acres in California. The amounts, including added lands, priority dates, and State where the water rights are perfected are as follows:

Amount (AFY)	*Acreage*	*Priority Date*	*State*
27,969	4,327	September 18, 1890	Arizona
75,566	11,691	February 2, 1911	Arizona
103,535	16,018		Arizona subtotal
16,720	2,587	September 18, 1890	California
12,534	1,939	September 18, 1890	Nevada
132,789	**20,544**		**Total**

In its June 19, 2000 Opinion, the U.S. Supreme Court accepted the Special Master's uncontested recommendation and approved the proposed settlement of the dispute respecting the Fort Mojave Indian Reservation. Under the settlement, the Tribe is awarded the lesser of an additional 3,022 AF of water or enough water to supply the needs of 468 acres. The Tribe's amended PPR for reservation lands located in California is set forth in the supplemental Decree entered by the U.S. Supreme Court on October 10, 2000.

Chemehuevi Tribe

The Chemehuevi Indian Reservation is located in Southern California on the plateau above the shoreline of Lake Havasu. The Tribe possesses PPRs from the mainstem of the Colorado River pursuant to the Decree and supplemental Decrees (1979 and 1984). The amounts, priority dates, and State where the rights are perfected are as follows:

Amount (AFY)	*Acreage*	*Priority Date*	*State*
11,340	1900	February 2, 1907	California

Colorado River Indian Tribes

The Colorado River Indian Reservation is located in southwestern Arizona and Southern California south of Parker, Arizona. CRIT occupies approximately 269,000 acres and 45 miles of River frontage. The Tribes possess PPRs from the mainstem of the Colorado River pursuant to the Decree and supplemental Decrees (1979 and 1984). The Tribes were awarded additional water for use on reservation lands by the supplemental Decree entered by the U.S. Supreme Court on October 10, 2000. Since the original Decree was entered in 1964, 315 acres of land were added to the reservation in California. The amounts, priority dates, and State where the rights are perfected are as follows:

Amount (AFY)	*Acreage*	*Priority Date*	*State*
358,400	53,768	March 3, 1865	Arizona
252,016	37,808	November 22, 1873	Arizona
51,986	7,799	November 16, 1874	Arizona
662,402	99,375		Arizona subtotal
10,745	1,612	November 22, 1873	California
40,241	6,037	November 16, 1874	California
5,860	879	May 15, 1876	California
56,846	8,528		California subtotal
719,248	**107,903**		**Total**

Quechan Indian Tribe

The Fort Yuma Indian Reservation (Quechan Indian Tribe) is located in southwestern Arizona and Southern California near Yuma, Arizona. The Tribe possesses PPRs from the mainstem of the Colorado River pursuant to the Decree and supplemental Decrees (1979 and 1984). The amount, priority date, and State where the rights are perfected are as follows:

Amount (AFY)	*Acreage*	*Priority Date*	*State*
51,616	7,743	January 9, 1884	California

A Supreme Court decision issued on June 19, 2000 allows the Tribe to proceed with litigation to claim rights to an additional 9,000 acres of irrigable lands. Proving this claim would increase the water rights for the reservation.

Cocopah Indian Tribe

The Cocopah Indian Reservation is located in southwestern Arizona near Yuma, Arizona. The Tribe possesses PPRs from the mainstem of the Colorado River pursuant to the Decree and supplemental Decrees (1979 and 1984). Since the original Decree was entered in 1964, 775 acres of land were added to the reservation. The amounts, priority dates, and State where the rights are perfected are as follows:

Amount (AFY)	*Acreage*	*Priority Date*	*State*
7,681	1,206	September 27, 1917	Arizona
2,026	318	June 24, 1974	Arizona
1,140	190	1915	Arizona
10,847	**1,714**		**Total**

The rights listed above include only that water diverted directly from the Colorado River at Imperial Dam. In addition to these rights, the Tribe has numerous well permits that divert groundwater that may be connected to the Colorado River within the boundaries of the U.S. (studies are ongoing). The 1974 PPR for the Cocopah Indian Reservation is unique because of its more recent priority date. The 1979 supplemental Decree in *Arizona v. California* specifies that in the event of a determination of insufficient mainstream water to satisfy PPRs pursuant to Article II (B) (3) of the 1964 Decree, the PPRs set forth in paragraphs (1) through (5) of Article II (D) of the Decree must be satisfied first. The 1984 supplemental Decree in *Arizona v. California* recognized the PPR for the Cocopah Indian Reservation dated June 24, 1974, and amended paragraph (5) of Article II (D) of the Decree to reflect this 1974 right. The Tribe is involved in litigation to claim rights to a total of 2,400 acres of irrigable lands. Proving this claim would further increase the water rights for the reservation.

Resources Affecting Multiple Tribes along the Lower Colorado River

The U.S. Supreme Court, in its 1979 supplemental decree, indicated that in the event the boundaries of the Fort Mojave, Chemehuevi, CRIT, Fort Yuma (Quechan Tribe), and Cocopah Indian Reservations are finally determined, the quantities of diversions for those respective reservations are to be computed by determining the net practicably irrigable acres for each reservation and multiplying that number times a unit diversion quantity of acre-feet per irrigable acre for each reservation. The unit diversion quantity for each reservation is as follows:

Unit Diversion Quantity

Indian Reservation	*Acre-Feet Per Irrigable Acre*
Cocopah	6.37
CRIT	6.67
Chemehuevi	5.97
Fort Mojave	6.46
Fort Yuma	6.67

Hydroelectric Power Generation. Headgate Rock Dam and Powerplant (Headgate) is owned and operated by the BIA. BIA supplies energy generated by Headgate's three turbines to CRIT and other Indian Tribes. Western markets any excess energy on the open market. Headgate is a run-of-the-river hydroplant, which means it is dependent on River flow to generate power. For this reason, it is unable to store water in excess of the amount that can flow through the generator turbines or through CRIT's diversion facilities. Any water that is not diverted by CRIT or used by the generators is spilled downstream. Section 3.3 provides a more detailed description of hydroelectric power generation.

Cultural Resources. Tribes with traditional and historic ties to the reach of the Colorado River from Hoover Dam/Lake Mead area to the SIB include CRIT and the Southern Paiute, Hualapai, Mojave, Chemehuevi, Yavapai, Quechan, Cocopah, Hopi, Zuni, and Navajo tribes. As described in section 3.9, the cultural resources of the project area have not been extensively inventoried, although a number of prehistoric and historic sites are known to exist.

Biological Resources. As discussed in section 3.2, the study area contains sensitive fisheries and wildlife resources, especially in the River itself; backwaters; and other marsh areas and within the riparian woodland areas. A substantial portion of this habitat is located on tribal lands along the River.

Other Potentially Affected Tribal Entities

La Jolla, Rincon, San Pasqual, Pauma, Pala Bands of Mission Indians

The reservations of the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians are located in northern San Diego County. As described in section 1.5.1, the San Luis Rey Indian Water Rights Settlement Act (Title I of P.L. 100-675) enacted by Congress in 1988 and amended by the Act of October 27, 2000, and Public Law 106-377, authorizes a settlement of water rights claims to San Luis Rey River water among the above-listed bands of Mission Indians and the City of Escondido, the Escondido Mutual Water Company (which is no longer in existence), and Vista Irrigation District.

The Act authorizes the Secretary to arrange for development of a water supply for the benefit of the bands of not more than 16 KAFY and authorizes the Secretary to use water conserved from the works authorized by Title II of the same Act for this purpose. The IA provides that the Secretary deliver Priority 3a water conserved from the AAC and Coachella Canal lining projects to MWD and/or IID and make water available for the benefit of the San Luis Rey Indian Water Rights Settlement Parties. The October 27, 2000 Amendment states the Secretary shall permanently furnish annually 16 KAF of the water conserved by the works authorized by Title II for the benefit of the San Luis Rey Indian Water Rights Settlement Parties in accordance with the settlement agreement. The implementation agreement for the San Luis Rey Indian Water Rights Settlement Act was signed January 18, 2001, and a copy of this implementation agreement is provided in Appendix H of this EIS. A settlement agreement among the parties to the litigation is under negotiation.

Torres Martinez Band of Desert Cahuilla Indians

The Torres Martinez Reservation is located on about 24,000 acres along the northern shore of the Salton Sea, and about 11,800 acres of the reservation are currently inundated by the Sea. The Torres Martinez Band of Desert Cahuilla Indians have sought damages and compensation for lands claimed to be inundated or damaged by the Salton Sea. In 1996, a Settlement Agreement was reached to provide compensation to the Tribe and provide a permanent flowage easement to IID and CVWD over the Indian Trust lands. The issue was resolved when legislation required to implement the settlement was passed in 2001 as Title VI of Public Law 106-568 (Torres Martinez Desert Cahuilla Settlement Claims Act).

The Tribe's existing water rights are held in trust by the U.S. In 1908, the U.S. Supreme Court (Winters v. US, 207 US 564) ruled that when Congress created Indian reservations, water rights needed to develop and support these reservations were reserved. The Winters Doctrine has been extended by rulings of the U.S. Supreme Court to include groundwater rights as well as surface water rights. Additional federal - and state - reserved water rights are provided through Executive Orders, Supreme Court decisions, statutes and regulations, all of which may apply to the Torres Martinez Reservation (USBR and SSA 2000).

No specific hunting or fishing rights other than those granted to all citizens with proper permits from CDFG have been identified in the subregion. CDFG regulates hunting and fishing in and around the Salton Sea, except within the Torres Martinez Reservation, where the Tribe is the primary regulatory and management authority. Significant gold deposits have been located on the Torres Martinez Reservation and are considered an ITA. The Tribe has indicated that they consider cultural resources located within the Torres Martinez Reservation to be ITAs (USBR and SSA 2000). While Reclamation policy does not consider prehistoric and historic sites to be ITAs, Reclamation will treat such resources as ITAs if they are located on reservation lands and the Tribe requests the sites be treated as such. Currently, approximately 70 archaeological resources are known to exist on the Torres Martinez Reservation (USBR and SSA 2000). Cultural resources located off-reservation are unlikely to be considered trust assets of the Tribe.

The Salton Sea covers approximately 40 percent of the Torres Martinez Reservation. In 1993, the 220,000-acre Salton Sea was officially designated as an impaired water body after the State of California conducted a water quality assessment. The results of the assessment revealed that salinity, selenium in fish tissue, recreational impacts, and non-point source pollution each contributed to unhealthy contamination levels.

The Salton Sea is considered by the Tribe to be one of its most precious natural resources. The Tribe has deep cultural, religious, and natural resource management connections to the Salton Sea, and to its fish and wildlife resources. The Tribe has been working with Reclamation to identify funding for a wetland habitat pilot project. The pilot project would be located on Tribal lands along the shore of the Salton Sea, and would be designed to enhance habitat for shorebirds and other avian and aquatic species.

Agua Caliente Band of Cahuilla Indians

The Agua Caliente Band of Cahuilla Indians is Cahuilla affiliated, with about 300 Tribal members and a Tribal Office in Palm Springs, California. The Agua Caliente Reservation was named for the Agua Calientes mineral springs and is located in, and adjacent to, the City of Palm Springs. Approximately 40,000 people reside on Tribal lands that are situated in a checkerboard pattern throughout this area.

Rainfall and snow melt from the mountain regions of the Agua Caliente Reservation causes perennial and intermittent stream flow in surrounding canyons. These canyon streams eventually discharge to the Whitewater River channel downstream of its diversion point. Groundwater-bearing formations exist in the eastern desert valley portion of the Reservation, and include unconsolidated alluvial deposits overlying Ocotillo conglomerate, which is the main water-bearing formation in the Coachella Valley. Groundwater evidence can also be seen in mineral springs at several locations.

Presently, more water is extracted from the groundwater basin than is recharged through rain or run-off. This situation creates a dangerous overdraft condition in an already arid region. Approximately two miles north of the Agua Caliente Reservation, Colorado River water is released to spreading basins in the Whitewater River channel in an effort to recharge groundwater in the upper Coachella Valley.

Augustine Band of Mission Indians

The Augustine Band of Mission Indians is Cahuilla affiliated and has a population of five Tribal members. The Augustine Reservation is situated in the lower Coachella Valley with tribal offices located in Coachella, California. The Augustine Band of Mission Indians was established by Executive Order on December 29, 1891. The original Augustine Membership Roll of 11 persons was prepared and approved by the Commissioner of Indian Affairs on April 13, 1956. The last surviving original member, Roberta Ann Augustine, died on May 9, 1987, leaving three children and two grandchildren. Maryann Martin, one of her descendants, is the current Tribal Chairperson and resides on the Augustine Reservation.

Groundwater on the reservation is confined or partially confined by impermeable clay lenses that cause horizontal groundwater flows and result in semi-perched conditions. Irrigation water used to flush salts from the soil in this highly productive agricultural area further contributes to the semi-perched conditions. The lower aquifer of Ocotillo conglomerate serves as the primary water-bearing formation in the Coachella Valley.

Cabazon Band of Mission Indians

The Cabazon Band of Mission Indians is Cahuilla affiliated and despite the name, was never under the control of the Spanish mission system. Today there are fewer than 50 members of the Tribe, although the reservation itself covers 1,450 acres in parcels spread over 16 miles in the Coachella Valley, near the City of Indio and 22 miles east of Palm Springs. The largest parcel contains the tribal administration office, the Public Safety Department and several business enterprises. Due to the proximity of the Salton Sea to their reservation, the Tribe is interested in the health and revitalization of the Salton Sea and surrounding wetlands.

Morongo Band of Mission Indians

The Morongo Band of Mission Indians is Cahuilla affiliated and has a population of 900 members, with Tribal Offices in Banning, California. The Morongo Reservation is situated in the foothills of the San Bernardino Mountains at the upstream end of the Whitewater River Watershed.

Perennial and intermittent stream flow, wetlands, and springs on the Morongo Reservation are fed from mountain rainfall and snow melt in the San Bernardino Mountains. Due to the close proximity of the San Andreas Fault system, the Morongo Tribe is involved in several projects to study the relationship between fault movement and changes in local hydrology. Variations in the volume and intensity of stream and spring flows have been observed prior to seismic activity in the region. Theoretically, faults could act as groundwater barriers causing groundwater to surface in springs and contributing to increased stream flow.

Twenty-Nine Palms Band of Mission Indians

The affiliation of the Twenty-Nine Palms Band of Mission Indians Tribal members is Chemehuevi. There are 14 tribal members and the Tribal Offices are located in Coachella, California. The Reservation is situated on a 150-acre parcel in the Coachella Valley and a 160-acre parcel in Twenty-Nine Palms near the Joshua Tree National Monument.

The Whitewater River Channel runs through the Twenty-Nine Palms Reservation and is referred to as the CVSC in the lower Coachella Valley. The channel conveys flow from wastewater plant discharges, agricultural drainage systems, and large rainfall events to the Salton Sea. Due to violations of bacterial water quality objectives and the threat of toxic bioassy results, the channel is on the Clean Water Act Section 303 (d) list of impaired surface waters.

3.10.2 Environmental Consequences

Impact Assessment Methodology

The proposed action and alternatives were reviewed to determine whether the direct or indirect effects of the components of the Federal actions would have an adverse impact on tribal resources, including ITAs. As part of this analysis, Reclamation consulted with BIA, potentially impacted Tribes within the project study area, and Tribes who may not be specifically located within the study area but are associated with relevant tribal resource issues.

No-Action Alternative

No Action for Implementation Agreement

There would be no impacts to tribal resources along the lower Colorado River under this alternative, including ITAs. Tribal water rights for the five tribes identified in section 3.10.1 that possess Federal reserved right PPRs and are located along the Colorado River would remain unchanged under the No-Action Alternative. All Colorado River tribal water rights for those five tribes would continue to be satisfied prior to those of lower priority water rights holders. No substantive changes to hydrology or water quality along the Colorado River would occur, nor would changes to biological resources, land use, cultural resources, or hydropower generation. Thus, tribal resources along the lower Colorado River would not be impacted by this alternative.

The structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, could lose $200 million in State funding and may not be implemented; therefore, there may not be water available from canal lining projects to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act.

Under the No-Action Alternative, the elevation of the Salton Sea is expected to decline to about elevation -235 feet msl over the 75-year study period. Potential impacts from exposure of currently inundated lands of the Torres Martinez Reservation would occur as described for the proposed action (see below), although the drop in elevation over the life of the project would not be as great. No additional Colorado River water would be provided to CVWD, and overdrafted groundwater conditions would continue.

No Action for Inadvertent Overrun and Payback Policy

Under this alternative, there would be no changes to hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power. No impacts to tribal resources would occur.

No Action for Biological Conservation Measures

If biological conservation measures were not implemented, there would be no conversion of land to habitat along the River. Under this alternative, there would be no changes to hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydropower. No impacts to tribal resources would occur.

Proposed Action

Implementation Agreement

COLORADO RIVER

Indian Trust Assets. There would be no significant adverse impact to ITAs within the Colorado River area from execution of the IA. Hunting and fishing rights, tribal lands and tribal water rights would not be impacted. The water transfers would impact only users with lower priority water rights than the PPRs, including Tribes; all tribal water rights would continue to be satisfied in the same manner as under the No-Action Alternative. The IA would facilitate the San Luis Rey Indian Water Rights Settlement Act. Given its implementation, transfers of water conserved by lining a section of the AAC are expected to begin in 2005, with full implementation in 2007. Transfers of water conserved by lining the unlined portion of the Coachella Canal are expected to begin in 2003, with full implementation in 2006.

Reclamation has concluded that power produced at Headgate is not an ITA, and Reclamation does not propose to mitigate or compensate for the reduced opportunity to produce power that results from the water transfers. As noted in section 3.3, power production has the lowest priority in terms of Colorado River operations, and is the result of water releases to meet water orders. Representatives from CRIT and the Fort Mojave Indian Tribe have suggested the California parties benefiting from the water transfers should compensate the tribes for the loss. There is concern about the precedent such compensation would create.

Water Quality. The IA would result in changes to water quality as described in section 3.1. The results of the analysis indicate that salinity levels at Imperial Dam would increase by approximately 8 mg/L compared to the No-Action Alternative. This change in salinity would impact tribal lands located along the Colorado River between Parker Dam and Imperial Dam. However, this increase falls within the normal range of fluctuations that occur along the reach. Further, mitigation in the form of additional salinity control projects would ensure that water quality targets established by the Salinity Control Forum would not be exceeded.

Biological Resources. Some of the anticipated impacts to wetland and riparian habitats described in section 3.2 would occur along the River, which includes tribal land. The fluctuations in water levels that would occur under the proposed action would impact existing biological communities within the River's floodplain between Parker and Imperial Dams. As noted in section 3.9 of this EIS, the riparian and marsh resources along the River are important to many Native American tribes. CRIT has an ongoing riparian restoration program along the River and has expressed concern that the potential reduction in Colorado River water surface elevation could impact its ability to divert water for the restoration program. As stated in section 3.1 of this EIS, the fluctuation in water surface elevations that would result from changes in the points of diversion would be within the historic variations experienced on the River. For this reason, CRIT's ability to divert water from the River should not vary from what has occurred in the past. It is anticipated that the conservation measures identified to reduce the impact to sensitive species and riparian /aquatic habitats, some of which could be implemented on tribal lands if agreed to by the Tribe, would also mitigate any impact to biological resources within tribal lands.

Land Use. Implementation of the IA would impact Colorado River water levels between Parker Dam and Imperial Dam. This change in elevation would be within the normal fluctuations that occur along the River in a typical year and would not impact land use along this reach. As noted above, biological conservation measures could be implemented on tribal lands with tribal consent.

Cultural Resources. As noted in section 3.9, no impacts on cultural resources along the Colorado River are anticipated as a result of implementation of the IA.

Hydroelectric Power Generation. Section 3.3 of this EIS describes hydroelectric power impacts associated with implementation of the proposed action. Power generation at Headgate Rock Dam, which is owned and operated by BIA for the purpose of satisfying tribal power needs, was included in this analysis. Energy from this facility is estimated to potentially be reduced by an average rate of 5.37 percent over the 75-year study period, with a maximum potential reduction of 6.3 percent. Although Headgate currently generates more energy than is used by CRIT, this reduction in Headgate energy could impact BIA's ability to meet future tribal energy demands, which would mean that the reduced increment of power would have to be purchased on the open market. In addition, excess Headgate energy is currently purchased by the Fort Mojave Indian Tribe. If the open market rate is higher than that charged by BIA, there would be an adverse economic impact to those tribes. BIA could also be impacted by having less surplus power to sell, resulting in a reduction in revenue to cover Headgate's operation and maintenance costs.

COACHELLA VALLEY WATER DISTRICT

As stated above, the potential effects of the proposed action within the CVWD service area are related to local actions and decisions made by CVWD. Nevertheless, an evaluation of potential ITA effects was conducted for the potential impacts (specifically groundwater impacts) that could occur within the CVWD service area. This evaluation was carried out to respond to comments received on the Draft EIS from EPA, BIA, and the Torres Martinez Band of Desert Cahuilla Indians. The following analysis was provided by CVWD based on their planned use of water made available from the IA. CVWD is preparing a separate Program EIR on its Coachella Valley Water Management Plan.

Implementation of the IA would result in an increase between 55 and 155 KAFY available for use in the CVWD service area in a "normal year". This water would be used in place of local groundwater and would, therefore, reduce the need to use groundwater to meet demand. In conjunction with the CVWMP (CVWD 2000a), this would ameliorate the current groundwater overdraft, result in an increase in drainage flows to the Salton Sea, and improve water quality in surface drains. The only potential impact to ITAs would be impacts to groundwater resources used by six Tribes identified in section 3.10.1 (Torres Martinez Band of Desert Cahuilla Indians, Agua Caliente Band of Cahuilla Indians, Augustine Band of Mission Indians, Cabazon Band of Mission Indians, Morongo Band of Mission Indians, and Twenty-Nine Palms Band of Mission Indians).

Groundwater recharge with Colorado River water would have a number of beneficial impacts on groundwater in the Lower Coachella Valley including increased water levels, reduced pumping lifts, reduced risk of land subsidence, prevention of groundwater quality degradation from percolating agricultural drainage, and reduced potential for salt water intrusion from the Salton Sea. However, recharge with Colorado River water is anticipated to have an adverse impact on the quality of groundwater extracted near the recharge basins in the Lower Coachella Valley because Colorado River water typically has higher concentrations of TDS and other chemical constituents than the local groundwater currently does. Wells located up to 2 to 3 miles down-gradient of the proposed CVWD recharge sites are most likely to experience elevated TDS compared to existing conditions during the 75-year evaluation period. Groundwater quality near the recharge basins would gradually change over time and may approach the quality of Colorado River water in the affected areas. Since the TDS of the local groundwater in portions of the basin is higher than Colorado River water, the magnitude of the water quality change varies with location. The anticipated TDS increase would not impair any beneficial uses of the water, as defined by established state and federal primary (or health-based) drinking water standards. The higher salinity could exceed recommended secondary water quality standards that deal with aesthetics, such as taste and hardness. Mitigation to reduce the higher TDS of Colorado River water to the equivalent quality of groundwater was evaluated and found to be financially and environmentally infeasible (personal communication, Steve Robbins, CVWD, May 2002[1]).

Water quality changes due to recharge with Colorado River water would only affect the groundwater supply of the Torres Martinez Band of Desert Cahuilla Indians. The Tribe has two production wells located near one of the potential CVWD recharge sites. The Torres Martinez wells are projected to be impacted within about 20 years after recharge commences. The wells of the Augustine Band of Mission Indians, Cabazon Band of Mission Indians and Twenty-Nine Palms Band of Mission Indians would not experience water quality changes within the 75-year Project term because their wells are located too far from the proposed recharge facilities. The wells of the Morongo Band of Mission Indians and Agua Caliente Band of Cahuilla Indians

1. CVWD evaluated the feasibility of reducing the higher TDS of Colorado River water to the equivalent quality of groundwater. Two alternatives were considered: 1) construction of an extension of the SWP into the Coachella Valley and 2) construction of desalination facilities for Colorado River water. The capital cost of extending the SWP to the valley ranged from $205 million to $390 million depending on the size of the facility. Total costs (including capital and operations) would range from $322 to $406/AF in addition to the cost of acquiring SWP water (about $200/AF). The capital cost of desalting Colorado River water ranged from $284 million to $1.19 billion depending on the size of the facilities and the method of brine disposal. The highest cost identified involved treating all Colorado River water entering the Coachella Valley. The cost of the desalted water ranged from $184 to $330/AF in addition to the costs of acquiring the water supplies and delivering them to customers in the valley. On the basis of economics alone, these options were found to be economically infeasible (CVWD unpublished data).

   In addition to the economics, each of these options have significant environmental impacts on their own. Environmental impacts include the disturbance of 300 to 400 acres of desert land for pipeline construction, loss of 500 to 3,500 acres of land for brine evaporation ponds, loss of habitat and biological resources, loss of cultural resources along facility alignments, air quality impacts from construction and generation of additional energy for the pump and treatment facilities, additional energy for pumping SWP water or running the desalters, and impacts related to salt disposal (CVWD unpublished data). Considering both costs and environmental impacts, these mitigation measures are considered infeasible.

would not be affected by the groundwater recharge because they are located up-gradient from any Colorado River water deliveries associated with the proposed action.

Recharge with Colorado River water could introduce low levels of perchlorate into the groundwater near the recharge basins. Perchlorate is an inorganic compound used as an oxidant in solid rocket propellants that interferes with the thyroid gland. Perchlorate enters the Colorado River from industrial drainage into Las Vegas Wash, a tributary to Lake Mead, and has recently been detected at levels of 4 to 6 ppb in Colorado River water delivered to the Coachella Valley. The recent installation of facilities to treat drainage from Las Vegas Wash is expected to significantly reduce the level of perchlorate in Colorado River water.

SALTON SEA

With implementation of the IA, IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea, as described in section 3.1.2. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change (if fallowing is the sole conservation method used and if additional fallowing is implemented to compensate for reduced inflows) to a reduction of as much as about 300 KAFY. Under the maximum impact scenario (300 KAFY conserved and all transferred out of the valley), the reduced inflow would increase salinity to as high as 163,500 mg/L by the end of the 75-year study period, and reduce water surface elevations to about –250 feet over the same period (personal communication, P. Weghorst, USBR 2001). This would result in the exposure of Torres Martinez Band of Desert Cahuilla Indians' tribal land that has been inundated by the Salton Sea. These exposed lands contain natural and cultural resources that are considered by the Tribe to be ITAs. Exposure could result in adverse impacts on cultural resources from vandalism and erosion. Potential beneficial impacts could result from allowing scientific investigations of exposed resources, including archaeological data collection and natural resource exploitation. However, flowage easements held over these lands by CVWD and IID would severely limit most economic development opportunities.

Because of their cultural, religious, and natural resource management connections to the Salton Sea, and to its fish and wildlife resources, the Tribe is quite concerned with any impact to the fishery resource or recreational economy.

The Tribe also has expressed concern about increases in wind-blown dust from the exposure of lands previously inundated by the Salton Sea, including the potential for contaminants in the exposed soils. In 1999, Levine-Fricke conducted a comprehensive study to evaluate sediments underlying the Salton Sea, collecting sediment samples at 73 locations in the Salton Sea and its three main tributaries (Levine-Fricke 1999). The study found concentrations of cadmium, copper, molybdenum, nickel, zinc and selenium in the seabed sediment at levels that exceeded maximum baseline concentrations for soils in the western U. S. The Levine-Fricke study also found that organic chemicals commonly used in agriculture in previous years were *not* detected at elevated concentrations in the sediment. These chemicals include DDT, many semivolatile organic compounds, chlorinated pesticides and PCBs, organophosphate and nitrogen pesticides, and chlorinated herbicides.

Adoption of Inadvertent Overrun and Payback Policy

INDIAN TRUST ASSETS

Tribal water rights would continue to be satisfied consistent with the existing priorities on the River. As noted in section 3.8 (Environmental Justice), the process cannot be applied to a diversion entitlement, because diversion contracts do not provide a quantified volume of use from which to measure the quantity of overrun, and from which to monitor payback. However, the policy does not infringe on diversion entitlements. As further noted in section 3.8, some PPRs, including the Federal establishment PPRs for Indian Tribes, have characteristics of both a diversion and a consumptive use entitlement. Those PPRs are defined as the lesser of a quantified diversion or the consumptive use required for irrigation of a quantified number of acres. A party with a diversion entitlement or an entitlement having characteristics of both a diversion and a consumptive use seeking to utilize the IOP could work with Reclamation to establish a technical basis for administration of the IOP.

WATER QUALITY

The adoption of the IOP in itself would not result in a substantive adverse impact to water quality. Therefore, no water quality impacts to tribal resources are anticipated.

BIOLOGICAL RESOURCES

No adverse impacts to biological resources are anticipated from adoption of the IOP in addition to execution of the IA and implementation of the QSA, as discussed in section 3.2. The overall flows in the River are not expected to substantially change from the present conditions; any yearly changes would be within the historical hydrological parameters of the river. Therefore, there would be no impact to biological resources associated with the tribes, or to the diversion used by CRIT for its riparian restoration program.

LAND USE

As described in section 3.4 of this EIS, no land use impacts, including impacts to tribal land uses, are expected with adoption of the IOP.

CULTURAL RESOURCES

As noted in section 3.9, Reclamation has committed to entering into consultation under Section 110 of the NHPA with SHPOs in Arizona, California, and Nevada, the Council, and other interested parties concerning how its ongoing operation of the lower portion of the Colorado River might be impacting historic properties. As a part of this effort, Reclamation will seek and consider the views of all the consulting parties with respect to the impacts of its ongoing operation of the lower Colorado River. Reclamation has therefore deferred assessment of the potential impacts to historic properties that might result from the adoption of an IOP to this larger Section 110 consultation effort.

HYDROELECTRIC POWER GENERATION

The analysis of the potential impacts of the IOP indicate that during the 75-year study period, on average, the estimated impact of the IOP to Headgate (in addition to the IA) would be a 1.5 percent increase in energy (1,167 MWh) during overrun years or a 1.1 percent decrease in energy (817 MWh) during payback years. The analysis also indicated that the maximum increase in energy produced at Headgate is anticipated to be 5.4 percent (4,060 MWh), which would occur during an overrun year (this is in addition to the impacts of the IA). The maximum decrease in energy produced at Headgate is anticipated to be 3.0 percent (2,283 MWh), which would occur during a payback year (this also is in addition to the impacts of the IA).

The above analysis assumes the most extreme IOP scenario (e.g., the largest payback, overrun and IOP account balance anticipated under the IOP). In fact, actual effects from the IOP to hydroelectric generation will probably be substantially smaller.

Implementation of Biological Conservation Measures

These measures would only potentially impact Tribes along the Colorado River.

INDIAN TRUST ASSETS

Specific locations for the construction and maintenance of biological conservation measures along the Colorado River have not yet been determined. Conservation measures would not be located on tribal lands without the express consent and desire by the tribe(s). To the degree that tribes desire to have riparian areas restored, enhanced, or created on tribal lands, and/or would experience improved hunting or fishing opportunities, this would be a potential beneficial impact to ITAs. Willing tribes that have suitable sites upon which conservation measures are ultimately located would be compensated for use of the land; this would provide an economic benefit. The source of water to implement the biological conservation measures (i.e., for irrigation of revegetated areas) has not yet been identified, since this is site-dependent; however, implementation of the biological conservation measures would not impact existing tribal water rights. No significant impacts to ITAs would result from implementation of this component of the proposed action.

WATER QUALITY

Construction of biological conservation measures has the potential for short-term, localized water quality impacts associated with construction of habitat restoration sites. Although these impacts could occur on tribal lands (with the Tribe's approval), they would not be substantive and would be short-term. Any work conducted in Waters of the U.S. would comply with sections 402 and 404 of the Clean Water Act. These measures would only have the potential to impact tribal lands along the Colorado River.

BIOLOGICAL RESOURCES

There is a potential that some of the sites where conservation measures would be implemented could be on tribal lands (with the Tribe's approval). As described in section 3.2, there may be short-term impacts to vegetation, fish, and wildlife during the construction phase of the project. It is expected that there would be a long-term enhancement of the habitat due to the implementation of these conservation measures.

LAND USE

Implementing biological conservation measures could convert some lands from agricultural use to backwaters or cottonwood-willow habitat. These habitat areas could be constructed on tribal lands. However, because the lands would only be provided by willing landowners, this conversion would not be an adverse impact to tribal land uses.

CULTURAL RESOURCES

As noted in section 3.9, specific locations have yet to be identified for implementation of the biological conservation measures associated with execution of the IA; thus, it is not possible at this time to assess the impacts of these actions on historic properties. As specific locations are identified and planning begins for implementation of the biological conservation measures, each project would be subject to individual NEPA compliance and Section 106 consultation. Reclamation thus is deferring the assessment of the impacts of the implementation of biological conservation measures associated with execution of an IA to these future consultation efforts.

HYDROELECTRIC POWER GENERATION

Implementation of the biological conservation measures would have no impact on hydroelectric power generation.

Mitigation Measures

COLORADO RIVER

No mitigation measures specific to tribal resources are proposed.

COACHELLA VALLEY WATER DISTRICT

CVWD would work with the Torres Martinez Band of Desert Cahuilla Indians to bring the drinking water supply of the Tribe into compliance by either providing domestic water service to the Tribe from CVWD's domestic water system or by providing appropriate well-head treatment should recharge of Colorado River water cause any Torres Martinez drinking water well to exceed any recognized health based water quality standard.

SALTON SEA

IID developed the Salton Sea Conservation Strategy to mitigate impacts on the salinity of the Salton Sea that are associated with conservation as part of the IID Water Conservation and Transfer Project EIR/EIS. With implementation of the Salton Sea Conservation Strategy, the

Salton Sea would be maintained at elevations at or above the No Action condition until at least the year 2030. After that time, reduced inflow would cause the Sea to decline to about elevation -240 feet msl by the year 2077, compared to the No Action elevation of -235 feet msl. This would result in less exposure of land that has been inundated by the Salton Sea (about 24 square miles as opposed to 68 square miles without the Conservation Strategy). By maintaining suitable salinity conditions in the Sea, implementation of the Salton Sea Conservation Strategy would minimize impacts to fish and wildlife as well as sport fishery, as discussed in sections 3.2 (biological resources) and 3.5 (recreational resources).

Air Quality. A four-step air quality mitigation plan has been developed by the IID to address the potential for increased wind-blown dust (see section 3.11 for more details). With implementation of the mitigation plan, the impact on air quality from exposed Salton Sea lands would be substantially reduced. However, because of the potential for interim impacts (between the time monitoring identifies a problem and implementation of the treatment) and uncertainty regarding with the cost and feasibility of treatment options, it is concluded that air quality impacts would be substantive and unavoidable.

Health Effects from PM-10 Particle Composition. Sufficient data do not exist to pinpoint the locations and extent of elevated metals concentrations in the exposed shoreline sediment. However, because the potential does exist for incremental health risks, IID's mitigation and monitoring plan includes the following steps to minimize the potential for health risks:

- Collect additional sediment samples;
- Monitor emissions from exposed shoreline;
- Monitor airborne concentrations;
- Assess potential health risks if necessary; and
- Apply mitigation if necessary.

These five steps are potentially sufficient to minimize the potential for health effects from toxic compounds in PM10 related to the proposed action. However, because of the uncertainty whether short-term and long-term air quality impacts and related health effects associated with exposed shoreline can be mitigated, it is concluded that air quality impacts, which include possible health effects as described above, are potentially substantive and unavoidable.

Cultural Resources. Possible impacts from vandalism of exposed cultural resources could be mitigated by control of public access on exposed tribal lands. As part of IID's four-step air quality mitigation plan noted above, IID would restrict public access (particularly off-road vehicle use) on exposed soils to the extent legally possible. IID would cooperate with the Torres Martinez Band of Desert Cahuilla Indians to restrict access to exposed reservation lands if desired by the Tribe.

Residual Impacts

There would be a residual impact of about a five percent reduction in power production at Headgate Rock Dam. The water transfers would reduce the opportunity to produce power downstream of Parker Dam as a result of more water being diverted from Lake Havasu and less at Imperial Dam.

Drinking water quality of the Torres Martinez Band of Desert Cahuilla Indians would be adversely affected by increased TDS from CVWD's groundwater recharge of Colorado River water. Further, the Torres Martinez Band of Desert Cahuilla Indians would be potentially affected by air quality impacts from exposed Salton Sea shoreline after the year 2030, depending on the efficacy of IID's air quality mitigation plan.

Alternative to the Inadvertent Overrun and Payback Policy

This alternative would only potentially impact Tribes along the Colorado River.

No Forgiveness During Flood Release Alternative

INDIAN TRUST ASSETS

There would be no change to any ITAs under this alternative. Tribal water rights would remain unchanged and no changes to hunting or fishing rights would occur. This alternative would not have a significant impact on ITAs.

WATER QUALITY

Impacts to tribal resources related to water quality would be the same as those described for implementation of the proposed action. Some fluctuations to water quality would occur in the portion of the Colorado River between Parker and Imperial Dams.

BIOLOGICAL RESOURCES

As described for the proposed action, no adverse impacts to biological resources on tribal lands would occur if this alternative were implemented.

LAND USE

No land use impacts, including impacts to tribal land uses would occur under this scenario.

CULTURAL RESOURCES

Impacts to cultural resources would be the same as the proposed IOP. Potential impacts to cultural resources would be indistinguishable from those associated with the ongoing operation of the lower portion of the Colorado River.

HYDROELECTRIC POWER GENERATION

Impacts of this alternative would be the similar to those discussed for the proposed action.

Mitigation Measures

No mitigation measures specific to tribal resources are proposed.

Residual Impacts

No residual impacts would occur.

3.11 AIR QUALITY

3.11.1 Affected Environment

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of ppm or micrograms per cubic meter ($\mu g/m^3$). One aspect of significance is a pollutant's concentration in comparison to a national and/or State ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The national standards, established by the EPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as the maximum acceptable ground-level concentrations that may not be exceeded more than once per year except for annual standards, which may never be exceeded. California standards, established by the California Air Resources Board (ARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are at least as restrictive as the NAAQS and include pollutants for which national standards do not exist. In the Arizona project region, the Air Quality Division (ADQ) of the Arizona Department of Environmental Quality has adopted the NAAQS to regulate sources of air pollution. In the Nevada project region, the Nevada Bureau of Air Quality has adopted the NAAQS and has promulgated additional standards to regulate sources of air pollution.

The main pollutants of concern within the project region include ozone (O_3), volatile organic compounds (VOCs), nitrogen oxides (NO_x), and particulate matter less than 10 microns in diameter (PM_{10}). Large portions of the region affected by the proposed action presently do not attain the national and/or California ambient air quality standards for O_3 and PM_{10}. Although there are no ambient standards for VOCs or NO_x, they are important as precursors to O_3 formation.

Regulatory Setting

Air quality regulations were first promulgated with the Federal Clean Air Act of 1969 (CAA). This act established the NAAQS and delegated the enforcement of air pollution control regulations to the States. In California and Arizona, the ARB and AQD, respectively, are responsible for enforcing air pollution regulations. The ARB has in turn delegated the responsibility of regulating stationary emission sources to local air agencies. In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP), detailing how the States will attain the standards within mandated time frames. The CAA Amendments of 1990 (1990 CAA) revised the attainment planning process. The 1990 CAA identifies new emission reduction goals and compliance dates based upon the severity of the ambient air quality standard violation within a region.

Section 176(c) of the 1990 CAA states that a Federal agency cannot support an activity unless the activity conforms to the SIP that applies to the project region. This means that federally supported or funded activities will not (1) cause or contribute to any new air quality standard violation, (2) increase the frequency or severity of any existing standard violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. Guidelines to determine compliance of Federal actions with Section 176(c) of the 1990 CAA are outlined in the EPA Final General Conformity Rule (EPA 1993a). The EPA General Conformity Rule applies to Federal actions that affect nonattainment and maintenance areas (areas that have been reclassified from nonattainment to attainment status and are required to prepare an air quality maintenance plan). Conformity requirements apply only to nonattainment and maintenance pollutants. A Federal action would comply with an applicable SIP if it does not exceed identified annual emission *de minimis* thresholds, the magnitudes of which are based on the severity of the nonattainment rating of the project region.

The following air pollution agencies, regulate air quality within the broad IA/QSA project region:

1. Imperial County Air Pollution Control District (ICAPCD), which includes all of Imperial County.

2. South Coast Air Quality Management District (SCAQMD), including the non-desert portions of Los Angeles and San Bernardino Counties, all but the eastern portion of Riverside County, and all of Orange County. This area is referred to as the SCAB.

3. Mojave Desert Air Quality Management District (MDAQMD), which includes the northern portion of San Bernardino County and the eastern portion of Riverside County.

4. San Diego County Air Pollution Control District (SDCAPCD), which includes all of San Diego County.

5. Ventura County Air Pollution Control District (VCAPCD), which includes the County of Ventura.

6. The AQD in the State of Arizona.

7. Clark County Air Pollution Control District, which includes all of Clark County, Nevada.

Existing Air Quality

Identifying the region of influence (ROI) for air quality requires knowledge of the types of pollutants being emitted, emission rates of pollutant sources, and meteorological conditions. The ROI for inert pollutants (generally pollutants other than O_3 and its precursors) is generally limited to a few miles downwind from a source. The ROI for O_3 can extend much farther downwind than for inert pollutants. Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly the reactive portion of VOCs and NO_x. In the presence of solar radiation, the maximum effect of VOCs and NO_x emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source.

Ozone concentrations are highest during the warmer months and coincide with the season of maximum insolation. Inert pollutant concentrations tend to be the greatest during periods of light winds and surface-based temperature inversions. These conditions limit atmospheric dispersion. However, in the case of PM_{10} impacts from fugitive dust episodes, maximum dust impacts within the project region often occur during high wind events and in proximity to manmade ground-disturbing activities.

The EPA designates all areas of the U.S. as having air quality better (attainment) or worse (nonattainment) than the NAAQS. The criteria for nonattainment designation varies by pollutant: (1) an area is in nonattainment for O_3 or 24-hour PM_{10} if its NAAQS has been exceeded more than three discontinuous times in 3 years and (2) an area is in nonattainment for any other pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have achieved attainment of the NAAQS are designated as maintenance areas. With regard to the NAAQS for O_3, the portions of the project region that do not attain this standard include Los Angeles, Orange, San Diego, and Imperial Counties and the southwestern portions of San Bernardino and Riverside Counties (EPA 2001b). The portions of the project region that do not attain the NAAQS for PM_{10} include Los Angeles, Orange, and San Bernardino Counties, the southwestern half of Riverside County, the southwestern two-thirds of Imperial County, and the greater Yuma region in Arizona (including roughly the Colorado River from Imperial Dam to the SIB). The South Coast Air Basin (SCAB) (the non-desert portions of Los Angeles and San Bernardino Counties, the western portion of Riverside County, and all of Orange County) also does not attain the NAAQS for carbon monoxide (CO) and the western portion of San Diego County has also been redesignated as a maintenance area for this pollutant.

The ARB also designates areas of California as being either in attainment or nonattainment of the CAAQS. An area is in nonattainment if a CAAQS has been exceeded more than once in three years. In regard to the CAAQS, the entire project region within California presently does not attain the O_3 and PM_{10} standards (ARB 2001). Additionally, Los Angeles County and the greater El Centro region in Imperial County do not attain the CO standard.

These regulatory agencies have developed air quality attainment plans designed to reduce emissions to a level that will bring their jurisdictions into attainment of the ambient air quality standards. Plans intended to attain the NAAQS are incorporated into the California and Arizona SIPs. Each regulatory agency has also developed rules to regulate stationary sources of air pollution within their jurisdictions.

In September 1997, the EPA promulgated 8-hour O_3 and 24-hour and annual $PM_{2.5}$ national standards (particulate matter less than 2.5 microns in diameter). However, due to a lawsuit in May 1999, the U.S. District Court rescinded these standards and EPA's authority to enforce them. Subsequent to an appeal of this decision by the EPA, the U.S. Supreme Court in February 2001 upheld these standards. As a result, this action initiates a new planning process to monitor and evaluate emission control measures for these pollutants. The EPA is moving forward to develop policies to implement these standards.

Climate and Meteorology

The effects of the Pacific Ocean and the Coastal Mountain ranges produce two distinct climate zones within the region. West of the Coastal Ranges, the climate is classified as Mediterranean, characterized by mild summers and winters. This region experiences higher humidity and precipitation than other parts of the project region, due to its proximity to the Pacific Ocean. East of the Coastal Ranges, within the Mojave and Lower Colorado River Deserts, the climate is classified as arid continental, with hot summers, low humidity, and large diurnal variations in temperature. The aridity of this region is due to a combination of factors, including (1) a semi-permanent high pressure system that produces atmospheric subsidence, (2) a cool ocean to the west that provides limited amounts of moisture, and (3) the rain shadow effects of the Coast Ranges, which blocks the flow of moisture into the region from the Pacific Ocean. This arid condition produces low soil moisture, which is responsible for one of the main air pollution problems in the region, fugitive dust (PM_{10}). The interior climate is characterized by more extreme temperatures compared to coastal locations.

The annual average precipitation within the region varies from a low of 3 inches in the Imperial and Coachella Valleys to over 40 inches in the higher coastal ranges to 10 to 15 inches along the coast of Southern California. Although most of the precipitation in the region is produced by winter storms from the North Pacific, summer rainfall from tropical air masses occasionally occurs. However, most of this activity occurs in the Coastal Ranges and desert regions to the east. Summer precipitation produces a large percentage of the annual precipitation totals for the portions of the project that affect the lower portion of the Colorado River.

3.11.2 Environmental Consequences

Impact Assessment Methodology

Potential air quality impacts from the proposed action are evaluated qualitatively in this EIS. Adverse impacts were evaluated on the basis of whether proposed emissions would exceed ambient air quality standards or thresholds developed by the relevant regulatory agencies. Specific actions associated with implementation of the IA and QSA will be evaluated in future environmental documents.

No-Action Alternative

No Action for Implementation Agreement

Under the No-Action Alternative, there is a likelihood that some of the facilities considered in this EIS may still be constructed in the CVWD service area to accommodate other elements of the CVWMP not directly related to the IA and QSA. There also is a potential for water conservation measures to be implemented in the IID service area even if the IA and QSA were not implemented. This could result in air quality impacts that are similar to those described in this EIS. No changes to the MWD and SDCWA service areas would occur that would be expected to impact air quality.

The reliability of Colorado River water supplies would not be increased for CVWD, MWD, and SDCWA under this alternative, and these agencies might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. Some of these actions might require construction, which would have air quality impacts.

As noted in section 3.1, the Salton Sea is expected to decline from its current elevation of about –227 feet to about elevation –235 feet over the 75-year study period (2002 – 2077) under the No

Action Alternative (i.e., no water transfers). This would expose currently inundated lands. The soils along the Salton Sea shoreline are predominantly silty clay in texture and consequently have a moderate potential for wind-blown dust. Once exposed, these soils would dry with a mineral crust covering, which would minimize the ability of winds to generate dust (PM_{10}) emissions. Dust emissions from these areas would in part be due to the level of human disturbances, such as vehicle activities, or from subsequent wind erosion. The new shoreline created by reduced inflow would only marginally increase the total land area within the ROI that presently generates fugitive dust emissions.

Odorous emissions presently occur from the Salton Sea as a result of algae blooms and flora and fauna die-offs, particularly during the warmer months of the year. These odors affect the people in the vicinity of the Salton Sea, and they will continue to do so in the future. Odors emitted from the Salton Sea are primarily associated with the effects of eutrophication. Eutrophication occurs as a result of nutrient inflows from agricultural drainage. In this process, algae production is limited by the availability of phosphorus. When the algae respire, dissolved oxygen is consumed from the Sea. Dissolved oxygen deficits are thought to be responsible for fish die-offs, which contribute to odor problems at the Salton Sea. Decomposition and sulfate reduction processes are also likely contributors to odors. Implementation of TMDLs proposed for the New and Alamo Rivers would reduce loading of phosphates in the Salton Sea, which could be expected to reduce odor occurrences.

No Action for Inadvertent Overrun and Payback Policy

No air quality impacts would result from not implementing the IOP.

No Action for Biological Conservation Measures

No air quality impacts would result from not implementing the biological conservation measures.

Proposed Action

Implementation Agreement

COLORADO RIVER (INCLUDES SOUTHEASTERN CALIFORNIA, WESTERN ARIZONA, AND SOUTHERN NEVADA)

Implementation of the IA would reduce the flow of water along the Colorado River between Parker and Imperial Dams. Over the long-term, this would intermittently expose land that is currently submerged along this reach of the Colorado River. The greatest effect would occur in April, when as much as 35 acres of open water in the main channel, 17 acres of open water in backwaters, and 28 acres of emergent vegetation in backwaters could be lost due to implementation of the QSA (FWS 2001). This relatively small amount of land would primarily consist of sandy soils and would promote some degree of revegetation. Therefore, these periodically dry lands would produce a minor amount of windblown fugitive dust (PM_{10}) emissions. Implementation of the IA would produce no substantive changes in water levels or fugitive dust emissions from the lakes that are fed by the River. At Lake Powell, water elevations would change only slightly and would generally be higher under the IA than under the No-Action Alternative. At Lake Mead, the differences would not be perceptible.

IMPERIAL IRRIGATION DISTRICT

Air quality impacts due to the construction of on-farm water conservation measures would occur from combustive emissions due to the use of fossil fuel-fired construction equipment and fugitive dust emissions due to ground-disturbing activities. The impact of combustive emissions would not be large enough in a localized area to cause an exceedance of an ambient air quality standard, as most emission sources would be mobile and intermittent in nature. Fugitive dust emissions from soil disturbances are considered to be within the realm of typical farm operations. Vehicles used by workers to maintain water conservation measures and systems would also produce minor amounts of combustive emissions. Conservation measures also could include fallowing. An increase in fallowed land could result in a decrease in combustive emissions from the construction of conservation measures. Fallowed lands would no longer be subject to plowing and other agricultural activities that would create windblown dust, but the exposed area of the fallowed lands could in itself create some windblown dust. A detailed analysis of IID's alternatives for water conservation and their impacts on air quality is included in the IID Water Conservation and Transfer Project EIR/EIS.

COACHELLA VALLEY WATER DISTRICT

Development of specific program elements, such as pipelines, pumping stations, and recharge basins, would generate air pollutant emissions from construction equipment, earth-moving activities and materials truck deliveries. These activities would cause temporary impacts to local air quality and could exceed air emission thresholds established by the SCAQMD within the SCAB project region. Mitigation measures for this impact will be identified in the PEIR being prepared by CVWD for the CVWMP or in project-level documents prepared for the construction of specific program components. Operation of facilities associated with implementation of the IA and QSA within the CVWD service area would have minimal impacts on air quality.

METROPOLITAN WATER DISTRICT

No construction or substantial changes in operations would occur within the MWD service area. As a result, implementation of the IA (which includes water deliveries to Escondido, the Vista Irrigation District, and the San Luis Rey settlement parties) would not produce any air quality impacts within the MWD service area.

SAN DIEGO COUNTY WATER AUTHORITY

No construction or substantial changes in operations would occur within the SDCWA service area. As a result, implementation of the IA and QSA water transfers would not produce any air quality impacts within the SDCWA service area.

SALTON SEA

Fugitive Dust from Exposed Shorelines. As described in section 3.11.2, the Salton Sea is expected to decline substantially from its current elevation under No Action conditions. As part of the IID Water Conservation and Transfer Project, IID proposes to implement water conservation measures that would reduce inflows to the Salton Sea. As a result, the surface water elevation of the Salton Sea would decline at a faster rate and to a greater extent under the proposed action than under the No Action. IID has determined that currently there is not enough data or exposed shoreline to accurately predict the potential for the IID proposed action to increase dust emissions from these areas or to determine their impacts to ambient concentrations of PM_{10} (IID and USBR 2002). However, IID has concluded that the potential for wind blown dust to occur from exposed shorelines of the Salton Sea is substantially less then for the dry Owens Lake. To be conservative, IID determined that the project would produce significant amounts of windblown dust from the exposed shoreline of the Salton Sea.

IID proposes to implement a program to mitigate dust emissions that could occur from the exposed shorelines as a result of the proposed action. The mitigation program includes a phased approach to monitor the receding shoreline and its dust emitting properties and to reduce emissions associated with this potentially significant impact. These efforts would occur, even though the proposed action is currently predicted to not reduce the level of the Salton Sea below No Action conditions until about the year 2035 (with implementation of the Salton Sea Conservation Strategy). However, IID indicates that a level of uncertainty would remain regarding whether or not the mitigation program would reduce short-term and long-term impacts. The mitigation section below describes the four-step mitigation plan that IID would implement as part of its proposed Water Conservation and Transfer Project.

Odorous Emissions. Implementation of the proposed Salton Sea Conservation Strategy (described in sections 3.1 and 3.2) would maintain inflows into the Sea that are comparable to No Action Conditions until about 2035. Depending on the source of mitigation water, inflow phosphate loading could remain the same or improve compared to the No Action scenario. After 2030, when IID's obligation to maintain Salton Sea salinity levels at No Action conditions ceases, inflows to the Salton Sea would fall below No Action levels. At that point, without the successful implementation of a Restoration Project, it is expected that the fishery would no longer reproduce or exist. Thus, odors from fish die-offs would not be a factor. Also, after 2035, inflows to the Salton Sea would decrease, which would reduce the phosphate loading into the Sea. Although the Sea would decrease in size in proportion to flow reductions, implementation of the TMDLs could reduce the concentration of phosphates in the Sea.

Given the complexity of the interrelationship of phosphate inputs, water quantity, and water quality, it is not possible to quantify the effect the proposed action would have on odorous emissions in the Salton Sea. However, compared to the existing conditions and projected continuation of eutrophication conditions at the Salton Sea, the effects of the proposed action on odors is expected to be minimal.

Adoption of Inadvertent Overrun and Payback Policy

Implementation of the IOP is not expected to substantially change river flows, and changes to reservoirs would be within the range of historic fluctuations. As a result, implementation of the IOP would produce minimal air quality impacts to this region. If the IOP resulted in the need to fallow fields in the IID service area in order to conserve water to payback an overrun, this effect would generally produce a beneficial impact to air quality, as the elimination of cultivation from these areas would reduce the amount of fugitive dust generated from these areas; unless the fallowed soils were treated with a soil stabilizer, however, they would generate some windblown dust.

Implementation of Biological Conservation Measures

Air quality impacts due to the implementation of biological conservation measures would result from combustive emissions due to the use of fossil fuel-fired construction equipment and fugitive dust emissions due to ground-disturbing activities. The proposed conservation measures that would produce the most emissions would include the restoration of backwaters and creation of willow flycatcher habitat. No specific locations or designs have been formulated for these measures. Some of the activities needed to implement these measures could include dredging, grading, vegetation clearing, and channel deepening. It is expected that the impact of combustive emissions from these activities would not be large enough in a localized area to cause an exceedance of an ambient air quality standard, as most emission sources would be mobile and intermittent in nature. Fugitive dust emissions could be substantial from activities that disturb large amounts of soil. However, implementation of fugitive dust control measures outlined below would effectively minimize PM_{10} emissions from proposed construction activities.

CONFORMITY APPLICABILITY ANALYSIS

The Federal action associated with the IA includes approval of the change in point of deliveries on the River, adoption of an IOP, and the development of biological conservation measures within the Colorado River flood plain. The proposed water transfers would not substantially impact present operations or the production of air emissions within any of the air pollutant nonattainment or maintenance areas that encompass the greater project region. Therefore, this portion of the Federal action would produce emissions that would be less than the conformity *de minimis* thresholds and would conform to the applicable SIPs within the project region.

Reclamation has yet to identify specific locations or designs for the development of the proposed biological conservation measures. Therefore, it is not possible to accurately locate and quantify the emissions from this portion of the Federal action for the purpose of determining conformity, as they are not deemed reasonably foreseeable. The General Conformity Rule allows a Federal agency to defer a conformity analysis for a programmatic action of this nature until project-specific information is available upon which to base the analysis (EPA 1993b). As a result, the conformity analysis for this portion of the IA Federal action will occur at a future date in association with proposals for project-specific actions. The requirements of the General Conformity Rule for the IA biological conservation measures will apply to the portions of the Colorado River Valley within Imperial (O_3 nonattainment area) and San Bernardino (PM_{10} nonattainment area) Counties and the greater Yuma area (PM_{10} nonattainment area).

Mitigation Measures

CONSTRUCTION IMPACTS

Construction activities associated with water conservation practices have the potential to exceed NO_x and PM_{10} emission thresholds within the SCAB portion of the CVWD project region or contribute to an exceedance of an ambient PM_{10} standard within the CVWD, IID, or Arizona project regions. More detailed analysis of these impacts, including mitigation measures, if necessary, will be identified by CVWD and IID as part of the future documentation for their respective projects. If proposed construction activities within the SCAB exceed a SCAQMD

NO_x emission threshold, one or more of the following measures could be implemented to reduce NO_x emissions from construction equipment (this list does not preclude the use of additional mitigation measures):

1. Retard injection timing by two degrees on diesel-powered equipment. This measure would reduce NO_x emissions by about 15 percent from these sources. Retarding injection timing by more then two degrees would further reduce NO_x emissions. However, this level of control would adversely decrease fuel efficiency.

2. Properly tune and maintain all construction equipment.

3. Use low-NO_x engines, alternative fuels, electrification, and other advanced technologies, whenever feasible.

One or more of the following measures could be implemented as standard operating practices to minimize combustive particulate matter (PM_{10}/$PM_{2.5}$) and fugitive dust (PM_{10}) emissions from proposed construction activities associated with the implementation of biological conservation measures (this list does not preclude the use of other mitigation measures):

1. Use particulate traps on diesel-powered equipment.

2. Minimize the use of diesel-powered equipment where feasible.

3. Use alternative diesel fuels in construction equipment where feasible.

4. Properly tune and maintain all construction equipment.

5. Apply water to areas where vehicles and equipment are involved in ground-disturbing activities.

6. Pave dirt roads or keep them wet, or apply non-toxic soil stabilizers, such as salts or detergents.

7. Increase water applications or reduce ground-disturbing activities as wind speeds increase.

8. Minimize the amount of disturbed area and vehicle speeds on site.

9. Cover inactive soil stockpiles or treat them with soil binders, such as crusting agents or water them to keep moist.

10. Cover trucks that haul soils or fine aggregate materials.

11. Designate personnel to monitor dust control program activities to ensure that they are effective in minimizing fugitive dust emissions.

12. Clean dirt from construction vehicle tires and undercarriages when leaving the construction site and before entering local roadways.

13. Sweep streets near the construction area at the end of the day if visible soil material is present.

OPERATIONAL IMPACTS

Implementation of one or more of the following BMPs could reduce fugitive dust emissions related to fallowing. This list does not preclude the use of additional measures as appropriate.

1. Implement conservation cropping sequences and wind erosion protection measures as outlined by the USDA Natural Resources Conservation Service, such as:

   – Plan ahead to start with plenty of vegetative residue and maintain as much residue on fallowed fields as possible. Residue is more effective for wind erosion protection if left standing.

   – If residues are not adequate, small grain can be seeded to take advantage of winter rains and lightly irrigated as needed to get adequate growth.

   – Avoid any tillage, if possible.

   – Avoid any traffic when fields are dry to avoid pulverization.

1. Apply soil stabilization chemicals to fallowed fields.

2. Re-apply drain or other unused water to allow protective vegetation to be established.

3. Reuse irrigation return flows to irrigate windbreaks across blocks of land including many fields to reduce emissions from fallowed, farmed, and other lands within the block. Windbreak species, management, and layout would be optimized to achieve the largest feasible dust emissions reduction per unit water available for their irrigation. Windbreak corridors would provide ancillary aesthetic and habitat benefits.

As part of the IID Water Conservation and Transfer Project, IID proposes to implement a program to mitigate dust emissions that could occur from the exposed Salton Sea shorelines. This program includes the following measures:

1. **Restrict Access.** Public access, especially off-highway vehicle access, would be limited, to the extent legally and practicably feasible, to minimize disturbance of natural crusts and soils surfaces in future exposed shoreline areas. Prevention of crust and soil disturbance is viewed as the most important and cost-effective measure available to avoid future dust impacts. IID or other governmental entities own or control most of the lands adjacent to and under the Salton Sea. Fencing and posting would be installed on these lands in areas adjacent to private lands or public areas to limit access.

2. **Research and Monitoring.** A research and monitoring program would be implemented incrementally as the Sea recedes. The research phase would focus on development of information to help define the potential for problems to occur in the future as the Sea elevation decreases slowly over time. Research would:

   – Study historical information on dust emissions from exposed shoreline areas.

– Determine how much land would be exposed over time and who owns it.

– Conduct sampling to determine the composition of "representative" shoreline sediments and the concentrations of ions and minerals in salt mixtures at the Sea. Review results from prior sampling efforts. Identify areas of future exposed shoreline with elevated concentrations of toxic substances relative to background.

– Analyze to predict response of Salton Sea salt crusts and sediments to environmental conditions, such as rainfall, humidity, temperature, and wind.

– Implement a meteorological, PM_{10}, and toxic air contaminant monitoring program to begin under existing conditions and continue as the Proposed Project is implemented. Monitoring would take place both near the sources (exposed shoreline caused by the Project) and near the receptors (populated areas) in order to assess the source-receptor relationship. The goal of the monitoring program would be to observe PM_{10} problems or incremental increases in toxic air contaminant concentrations associated with the Proposed Project and to provide a basis for mitigation efforts.

– If incremental increases in toxic air contaminants (such as arsenic or selenium, for example) are observed at the receptors and linked to emissions from exposed shoreline caused by the Project, conduct a health risk assessment to determine whether the increases exceed acceptable thresholds established by the governing air districts and represent a significant impact.

– If potential PM_{10} or health effects problem areas are identified through research and monitoring and the conditions leading to PM_{10} emissions are defined, study potential dust control measures specific to the identified problems and the conditions at the Salton Sea.

3. **Create or Purchase Offsetting Emission Reduction Credits.** This step would require negotiations with the local air pollution control districts to develop a long-term program for creating or purchasing PM_{10} emission reduction credits. Credits would be used to offset emissions caused by the Proposed Project, as determined by monitoring (see measure 2 above). IID proposes negotiation of an offset program that would allow purchase of credits available under banking programs, such as ICAPCD Rule 214 for agricultural burning. Other means of dust control and PM_{10} emission reductions available for application to agricultural operations in the IID service area would also be pursued for credit banking opportunities (e.g., managing vacant lands, improvements to farming practices to reduce PM_{10}, and road paving). This step would not be used to mitigate toxic air contaminants (if any); Step 4 would be necessary if toxic air contaminants pose a significant health issue.

4. **Direct emission reductions at the Sea.** If sufficient offsetting emission reduction credits are not available or feasible, this mitigation plan would implement one or more of the following:

   – Implementing feasible dust mitigation measures. This includes the potential implementation of new (and as yet unknown or unproven) dust control technologies that may develop at any time during the term of the Proposed Project; and/or

- If feasible, supplying water to the Sea to re-wet emissive areas exposed by the Proposed Project, based on the research and monitoring program (step 2 of this plan). This approach could use and extend in time the Salton Sea Conservation Strategy.

If, at any time during the Project term, feasible dust mitigation measures are identified, these could be implemented in lieu of other dust mitigation measures or the provision of mitigation water to the Sea. Thus, it is anticipated that the method or combination of methods could change from time to time over the Project term.

Residual Impacts

IID indicates that a level of uncertainty would remain regarding whether or not the mitigation program would reduce short-term and long-term impacts from dust emissions that could occur from the exposed Salton Sea shorelines. This impact remains potentially significant and unavoidable.

Alternative to the Inadvertent Overrun and Payback Policy

No Forgiveness During Flood Releases Alternative

Air quality impacts of this alternative would be similar to those described for the proposed IOP.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

3.12 TRANSBOUNDARY IMPACTS

The body of NEPA law directs Federal agencies to analyze the reasonably foreseeable consequences of proposed actions, regardless of where impacts might occur. Based on this, the CEQ, in a July 1, 1997 memorandum to heads of agencies, has determined that NEPA requires agencies to include analysis of reasonably foreseeable transboundary effects in their analysis of proposed actions in the U.S.. The CEQ further states that such effects are best identified during the scoping stage, and should be analyzed to the best of the agency's ability using reasonably available information. Such analysis should be included in the environmental documentation for the proposed action (CEQ 1997). The CEQ policy has been incorporated into DOI's Environmental Statement Memorandum (ESM) 97-2.

3.12.1 Hydrology/Water Quality/Water Supply

Affected Environment

As illustrated in Figure 3.12-1, from Morelos Dam at the NIB (the California-Mexico border), the Colorado River flows southwesterly, roughly paralleling the Arizona-Mexico border. After passing the SIB (the Arizona-Mexico border), the river flows southwest and receives tributary flows from the Rio Hardy before draining into the Sea of Cortez.

The principal potential transboundary effect (with regard to water resources) relates to change in flows to Mexico. Flows in the reach of the Colorado River below Imperial Dam are primarily water to be delivered to Mexico in accordance with the United States-Mexico Water Treaty of 1944. Under Article 10(a) of the Treaty, Mexico is entitled to an annual amount of 1.5 MAF of Colorado River water. Under Article 10(b) of the Treaty, Mexico may schedule up to an additional 0.2 MAF when "there exists a surplus of waters of the Colorado River in excess of the amount necessary to satisfy uses in the United States." Article 10(b) also stipulates that in the event of an extraordinary drought or serious accident to the irrigation system of the U.S., water allotted to Mexico can be reduced in the same proportion as consumptive uses in the U.S. are reduced.

In December of each calendar year Mexico provides the U.S. with a monthly water order for the upcoming year. By United States-Mexico Water Treaty of 1944, the order can be no less than 900 cfs and no more than 5,500 cfs during the months of January, February, October, November, and December; during other months the water order must be no less than 1,500 cfs and no more than 5,500 cfs. Daily water flows are not allowed to vary by more than 500 cfs.

Much of the water intended for Mexico is diverted into the AAC and is later returned to the Colorado River bed at the Siphon Drop and Pilot Knob power plants. Only a portion of the Mexico delivery remains in the River, passing through Imperial Dam to Morelos Dam. The River is generally without water below Morelos Dam. Flows below Morelos Dam are primarily excess flows that result from (1) operational activities upstream (e.g., canceled water orders in the U.S., maintenance activities, etc.); (2) a Gila River flood event; (3) flood control releases along the mainstem of the Colorado River; or (4) Morelos Dam gate leakage.

Figure

3.12-1 Colorado River Location within Mexico

black and white

Water released from Parker Dam that has been ordered by irrigation districts in Imperial Valley, Coachella Valley, and the lower Colorado River Valley, normally takes up to three days to reach its point of diversion. Occasionally unforeseen events, such as localized precipitation, force the irrigation districts to cancel these water delivery orders after the water has been released at Parker Dam. Usually the water is diverted at Morelos Dam for use in Mexico; however, some of this water may flow past Morelos Dam.

Gila River flood events are extremely rare. Only once from 1941 to the present has flow been recorded over 4,000 cfs at the Dome, Arizona gaging station. In 1993 up to 27,500 cfs flowed past the Dome gaging station as a result of the 1993 Gila River flood (USGS 1999).

Excess flows to Mexico are almost entirely due to flood control releases originating at Hoover Dam. As discussed in section 3.1, these flood control releases are dictated by the flood control criteria established for Lake Mead and Hoover Dam by the USACE and are dependent upon hydrologic conditions.

The waters of the Colorado River, once delivered to Mexico, are under the jurisdiction of Mexico. The United States-Mexico Water Treaty of 1944 contains no provisions requiring Mexico to provide water for environmental protection, nor any requirements relating to Mexico's use of that water[1]. As flood flows arrive at Morelos Dam, Mexico has the discretion to divert more water than its water order or allow all the additional flows to pass downstream of Morelos Dam. In the past Mexico has generally chosen to increase its diversion for use in agriculture for increased crop production and soil salinity improvement, or for diluting flows delivered at the SIB, municipal industrial uses, or to recharge groundwater aquifers in the Mexicali Valley (USBR 2001).

Water Quality

Per Minute No. 242 of the United States-Mexico Water Treaty of 1944, the U.S. must deliver water to Mexico with an average annual salinity concentration no greater than 115 ppm +/- 30 ppm over the average annual salinity concentration of the River at Imperial Dam. Thus, an increase in salinity at Imperial Dam directly translates to an allowable increase in salinity of water delivered to Mexico and an increase in salinity of water flowing past Morelos Dam.

Average flow weighted salinity at Imperial Dam for the period 1990 to 1999 varied from 655 to 803 mg/L, below the numeric criterion of 879 mg/L (DOI 2001). Salinity is projected to increase at Imperial Dam to928 mg/L by the year 2015 without additional controls (DOI 1999). With implementation of additional salinity control projects in accordance with the Plan of Implementation adopted by the Colorado River Basin Salinity Control Forum, the numeric criterion would be met.

1. However, in December 2000, the governments of the United States and Mexico, through Minute 306 of the United States-Mexico Water Treaty of 1944 agreed to (1) develop joint studies that include possible approaches to ensure use of water for ecological purposes in the limitrophic reach and its associated delta; and (2) through a binational technical task force, to examine the effect of flows on the existing riparian and estuarine ecology of the Colorado River from its limitrophe section to its delta with a focus on defining the habitat needs of fish, and marine and wildlife species of concern to each country.

Environmental Consequences

No biological conservation measures would be implemented downstream of Imperial Dam; thus, they would not impact water resources in Mexico and are not considered further.

Impact Assessment Methodology

DELIVERIES TO MEXICO

The impact assessment methodology for impacts related to deliveries to Mexico is described in detail in section 3.1.2 and Appendices C and G. Important modeling assumptions specific to transboundary impacts include the following:

- No specific shortage guidelines exist for operations of Lake Mead (see section 3.1.2). For modeling purposes, shortage deliveries to Mexico were assumed to occur under Level 2 water supply shortage conditions when deliveries to CAP were cut to zero and further cuts to MWD and Mexico were necessary to keep Lake Mead water surface elevations above 1,000 feet msl.

- Normal deliveries to Mexico were defined as 1.515 MAF, 1.5 MAF per the United States-Mexico Water Treaty of 1944 requirements and an additional 15 KAF from typical water scheduling errors and water that is ordered by Lower Basin users but that is not diverted.

- Surplus deliveries, of up to 200 KAF, would occur only when Lake Mead makes flood control releases.

- Annual deliveries of more than 1.7 MAF constitute excess flows. It is these excess flows that that have the potential to occur below Morelos Dam.

EXCESS FLOWS

The methodology used to assess impacts of the IA on excess flows is described in section 3.1.2 and Appendix G. To estimate the layered impact of the IOP and IA on the magnitude and frequency of excess flow to Mexico, the mean and maximum values of the estimated future overrun account balances were input into CRSS as depletions to Lake Mead. (Detail on the IOP modeling process is provided in section 3.1.2 and in Appendix C). This approach provided a means of identifying the average and maximum potential impact that could occur in any given flood release year under each of the modeled IOP scenarios. However, the frequency or probability that such an impact would occur is slight; it is a function of the frequency that the respective overrun amount would be incurred times the probability that a flood release for that given year would occur.

It should be emphasized that Mexico's water management decisions at and below Morelos Dam were not modeled due to uncertainty regarding what Mexico would choose to do with excess water.

It has been estimated that periodic annual flows of 250 KAF or greater are necessary for maintaining the health of the Colorado River corridor in Mexico and the estuary at the upper end of the Sea of Cortez (Leuke et al. 1999), and to help restore floodplain habitat. For this reason, this analysis presents information on the occurrence of excess flows of 250 KAF and 1 MAF.

No-Action Alternative

WATER DELIVERIES

Under No Action, for the period 2002 to 2076, the probability that deliveries to Mexico would meet or exceed 1.515 MAF is greater than 99 percent. The probability of surplus supplies being available would be about 17 percent. The probability of shortage conditions is estimated as 1 percent with an anticipated minimum delivery of 962 KAF (refer to Appendix G for more detail).

Under the No-Action Alternative, from years 2002 to 2026 the probability of excess flows varies from 20 to 25 percent. After 2030 the probability of flood flows decreases to 10 to 15 percent. The magnitude of flood flows varies from 0 to over 6 MAF, with large flood flows (over 250 KAF) anticipated approximately 16 percent of the time and flood flows over 1 MAF less than 15 percent of the time (refer to Tables 3.12-5 and 3.12-6).

WATER QUALITY

Salinity. Average flow weighted salinity at Imperial Dam for the period 1990 to 1999 varied from 655 to 803 mg/L, below the numeric criteria of 879 mg/L (DOI 2001). Salinity is projected to increase at Imperial Dam to 928 mg/L by the year 2015 without additional controls (DOI 1999). While this could correlate to an increase in salinity in water delivered to Mexico and water flowing past Morelos Dam, it is assumed that salinity control programs will continue to be implemented and objectives will be met (refer to section 3.1.2).

Proposed Action

IMPLEMENTATION AGREEMENT AND ADOPTION OF INADVERTENT OVERRUN AND PAYBACK POLICY

Water Deliveries. Table 3.12-1 makes specific comparisons of the No Action and the IA and illustrates that deliveries to Mexico are basically unaffected by the IA relative to No Action.

Table 3.12-1. Summary of Deliveries to Mexico: Comparison of No Action and IA

	INTERIM SURPLUS PERIOD		YEARS 2017 TO 2076		YEARS 2002 TO 2076	
	No Action	*IA*	*No Action*	*IA*	*No Action*	*IA*
Percent time normal deliveries met or exceeded [a]	100	100	99	99	99	99
Percent time surplus delivered	21	21	16	17	17	17
Percent of time shortage conditions	0	0	1	1	1	1
Minimum shortage delivery	NA	NA	962 KAF	962 KAF	962 KAF	962 KAF

[a] This row includes the percent of time normal and surplus deliveries are made (refer to Appendix G).

Excess Flows. The inadvertent overrun and payback policy does not apply to Mexico. However, actions undertaken by IOP users could affect excess flows to Mexico. As illustrated in Figure 3.12-2, the probability of excess flows to Mexico would be similar but occasionally higher under the IA than No Action. A similar comparison for selected years is presented in tabular format in Table 3.12-2. Generally the IA would provide a slightly higher frequency of excess flows than the No Action, from 1 to 5 percent higher. After 2037, there were no differences in the modeled frequency of excess flows between the IA and No Action. The gradual declining trend observed under both No Action and the IA coincides with the Basin States' plans to maximize consumptive use of their Colorado River water apportionment for agricultural, municipal, and industrial use application, as exhibited by the Basin States' demand projections.

As illustrated in Figures 3.12-3 and 3.12-4, the magnitude of excess flows to Mexico is also similar for the IA and No Action. In eight of the 76 years modeled, under the IA there was about a 5 percent greater probability of flows in excess of 250 KAF, than would occur under No Action (refer to Figure 3.12-3). In only a very few instances, as illustrated in Figure 3.12-4, would the probability of flood flows greater than 1 MAF be higher (about two percent) under the IA relative to No Action.

Another way to compare the magnitude of flows under the IA relative to No Action is to compare the excess flows for the 75th and 90th percentiles, as shown in Tables 3.12-3 and 3.12-4.

These tables, in addition to Figures 3.12-2 through 3.12-4, illustrate that there would be only minor differences in the potential magnitudes and potential frequency of excess flows between the No Action and IA. During the initial 15 years that were modeled (ISG period), the average frequency of occurrence of beneficial flows (exceeding 250 KAF) in any year would be 18.9 percent for No Action. This compares to a frequency of 19.7 percent for the IA (a slight improvement). For the entire 75-year period of analysis, the average frequency of occurrence is approximately the same for the No Action and IA (ranging between 15.9 percent and 16.2 percent or about one in every six years).

While under the IA excess flow probability and magnitude are generally equal to, or somewhat greater than would occur under No Action, the overall effect of the combined IA and IOP is to decrease the magnitude of a flood release.

For analysis purposes, the mean and maximum values of the range of estimated future overrun account balances under each modeled IOP scenario were used to evaluate the potential effect on Lake Mead flood control releases and excess flows to Mexico.

The probability and magnitude of a flood release (and thus excess flows), is affected by the amount of water in storage. The amount of water in storage is dependent on many variables, primarily rainfall and inflow, but also policies related to flood control (per flood control policies many reservoirs are drawn down in the winter to accommodate potential floods; in the summer reservoirs are allowed to store more water), releases to create flood control space, surplus declarations, and the equalization policy between Lake Mead and Lake Powell. With the IOP, water may be "owed to the system" meaning less water is in storage and thus there is more space in Lake Mead to capture flood water thereby reducing flood releases. However, because flood releases would be minimized, in the following year Lake Mead may be at a higher elevation than it would have been without the IOP. In this following year if flood releases are

Figure

3.12-2 Probability of Occurrence of Excess Flows Below Mexico Diversion at Morelos Dam, Comparison of the No-Action and IA Alternatives

Table 3.12-2. Frequency Occurrence of Excess Flows Below Morelos Dam — Comparison of No Action and IA

Selected Year	*No Action*	*Implementation Agreement*	*Difference*
2002	2%	2%	0%
2003	20%	21%	1%
2004	24%	24%	0%
2005	21%	21%	0%
2006	24%	25%	1%
2007	29%	29%	0%
2008	25%	25%	0%
2009	25%	25%	0%
2010	20%	20%	0%
2011	20%	21%	1%
2012	20%	20%	0%
2013	20%	25%	5%
2014	19%	19%	0%
2015	20%	21%	1%
2016	19%	21%	2%
2020	21%	24%	3%
2025	21%	20%	1%
2030	21%	21%	0%
2035	21%	21%	0%
2040	18%	18%	0%
2045	13%	13%	0%
2050	15%	15%	0%
2055	13%	13%	0%
2060	14%	14%	0%
2065	14%	14%	0%
2070	14%	14%	0%
2075	14%	14%	0%

Figure

3.12-3 Probability of Occurrence of Excess Flows Greater than 250 KAF Below Mexico Diversions at Morelos Dam, Comparison of the No-Action and IA Alternatives

Figure

3.12-4 Probability of Occurrence of Excess Flows Greater than 1 MAF Below Mexico Diversion at Morelos Dam, Comparison of the No-Action and IA Alternatives

Table 3.12-3. Excess Flows Below Morelos Dam Comparison of IA to No Action 75th Percentile Values for Selected Years (KAF)

Selected Years	*No Action*	*Implementation Agreement*
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	0	0
2007	283	404
2008	0	0
2009	0	0
2010	0	0
2011	0	0
2012	0	0
2013	0	0
2014	0	0
2015	0	0
2016	0	0
2020	0	0
2025	0	0
2030	0	0
2035	0	0
2040	0	0
2045	0	0
2050	0	0
2055	0	0
2060	0	0
2065	0	0
2070	0	0
2075	0	0

Table 3.12-4. Excess Flows Below Morelos Dam
Comparison of IA to No Action
90th Percentile Values for Selected Years (KAF)

Selected Years	*No Action*	*Implementation Agreement*
2002	0	0
2003	957	957
2004	1,908	1,934
2005	1,836	1,922
2006	1,981	2,027
2007	2,445	2,597
2008	1,842	1,977
2009	2,015	2,247
2010	1,503	1,503
2011	1,214	1,409
2012	1,921	1,753
2013	1,580	1,806
2014	961	1,571
2015	900	1,039
2016	1,591	1,748
2020	1,833	1,846
2025	1,107	1,101
2030	1,013	1,013
2035	800	811
2040	902	902
2045	634	634
2050	734	734
2055	753	753
2060	700	700
2065	669	669
2070	577	589
2075	516	516

necessary, indirectly the IOP could cause an increase in excess flows. Because of all these complicating factors, there is not a one-to-one ratio between the amount of water owed to the system by IOP users and changes in excess flows.

As illustrated in Figure 3.12-5, the probability of excess flows to Mexico would be similar under the combined IA and IOP and the No-Action figures (assuming the average IOP account balance of 66 KAF). A similar comparison for selected years is presented in tabular format in Table 3.12-5. In some years probability of excess flow would be greater and in some years lower, but the probability of excess flow for the No Action and combined IA and IOP scenarios (assuming an average IOP account balance of 66 KAF) never differs by more than 1.2 percent. If the maximum IOP account balance was held (331 KAF), the probability of a flood release could be decreased by 1 to 3.5 percent.

Figures 3.12-6 and 3.12-7 and Tables 3.12-6 and 3.12-7, compare the probability of occurrence of excess flow of 250 KAF and 1 MAF for No Action and the combined IA and IOP, assuming an average IOP account balance of 66 KAF. As illustrated in these figures, the magnitude of excess flows to Mexico is also similar for the combined IA and IOP relative to No Action. The probability that excess flows to Mexico will exceed 250 KAF differs by no more than 1.4 percent between the combined IA and IOP and No Action. Likewise, the probability that excess flows will exceed 1 MAF also differs by no more than 1.1 percent between the combined IA and IOP and No Action.

Figure 3.1-8 shows the range of observed magnitudes of excess flows for years 2006 and 2016. Figure 3.12-9 shows the range of observed magnitudes of excess flows for years 2026 and 2050. In year 2006, the magnitude of the observed excess flows is essentially the same, albeit with a slight change in the frequency. The positive effect seen in the lower excess flow range (excess flows less than 1.0 MAFY) is perhaps more related to the effect of the water transfers modeled as part of the IA conditions. The negative effect seen on the higher range of the excess flows (excess flows greater than 1.0 MAFY) can be attributed to the IOP modeled criteria. The same generally applies to years 2016, 2026 and 2050. The observed increases in magnitude ranged from approximately 2 KAF to approximately 148 KAF with the average being around 88 KAF. The observed decreases in magnitude ranged from approximately 1.3 KAF to approximately 742 KAF with the average being around 230 KAF.

These figures and table compare and provide a summary of the differences between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY and the differences between the No Action and the IA that considered a Lower Basin Overrun Account Balance of 331 KAFY. Table 3.12-8 provides the comparison of the modeled results for years 2006, 2016, 2026 and 2050, respectively. Again, all of these modeled conditions further considered a 10 Percent Maximum Allowed Overrun and a 3-Year Payback Schedule.

For all years, it should be emphasized that not all of the differences in observed excess flows were negative (reductions). In both comparisons, there were modeled years where the differences were positive, which represented increases in the magnitude of observed excess flows. For example, in the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, approximately 16

Figure

3.12-5 Probability of Occurrence of Excess Flows Below Mexico Diversion at Morelos Dam, Comparison of No Action, IA, and Combined IA and IOP Assuming Average Overrun Account Balance

Table 3.12-5. Frequency Occurrence of Excess Flows Below Morelos Dam Comparison of No Action and Combined IA and IOP [a]

Selected Year	*No Action*	*IA and IOP*	*Difference*
2002	2.4%	2.4%	0.0%
2003	20.0%	20.0%	0.0%
2004	23.5%	23.5%	0.0%
2005	21.2%	21.2%	0.0%
2006	23.5%	23.5%	0.0%
2007	29.4%	29.4%	0.0%
2008	24.7%	24.7%	0.0%
2009	24.7%	24.7%	0.0%
2010	20.0%	20.0%	0.0%
2011	21.2%	21.2%	0.0%
2012	20.0%	20.0%	0.0%
2013	22.4%	22.4%	0.0%
2014	20.0%	18.8%	1.2%
2015	21.2%	21.2%	0.0%
2016	18.8%	20.0%	1.2%
2020	22.4%	23.5%	1.2%
2025	21.2%	20.0%	1.2%
2030	21.2%	21.2%	0.0%
2035	21.2%	20.0%	1.2%
2040	17.6%	16.5%	1.2%
2045	12.9%	12.9%	0.0%
2050	15.3%	15.3%	0.0%
2055	12.9%	12.9%	0.0%
2060	14.1%	14.1%	0.0%
2065	14.1%	14.1%	0.0%
2070	14.1%	14.1%	0.0%
2075	14.1%	14.1%	0.0%

[a] This assumes an average overrun account balance of 66 KAF

Figure

3.12-6 Probability of Excess Flows Greater than 250 KAF, Comparison of No Action, IA, and Combined IA & IOP Assuming Average Overrun Account Balance

Figure

3.12-7 Probability of Excess Flows Greater than 1 MAF, Comparison of No Action, IA, and Combined IA & IOP Assuming Average Overrun Account Balance

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Table 3.12-6. Probability of Excess Flows Greater than 250 KAF, Comparison of No Action and Combined IA & IOP Assuming Average Overrun Account Balance [a]

Selected Year	*No Action*	*IA and IOP*	*Difference*
2002	2.4%	2.4%	0.0%
2003	17.6%	17.6%	0.0%
2004	21.2%	21.2%	0.0%
2005	18.8%	18.8%	0.0%
2006	22.4%	22.4%	0.0%
2007	27.1%	25.9%	1.2%
2008	23.5%	23.5%	0.0%
2009	23.5%	23.5%	0.0%
2010	18.8%	18.8%	0.0%
2011	21.2%	21.2%	0.0%
2012	20.0%	20.0%	0.0%
2013	20.0%	21.2%	1.2%
2014	18.8%	18.8%	0.0%
2015	18.8%	18.8%	0.0%
2016	18.8%	18.8%	0.0%
2020	18.8%	18.8%	0.0%
2025	20.0%	20.0%	0.0%
2030	20.0%	20.0%	0.0%
2035	20.0%	20.0%	0.0%
2040	15.3%	15.3%	0.0%
2045	12.9%	11.8%	1.2%
2050	14.1%	14.1%	0.0%
2055	11.8%	11.8%	0.0%
2060	12.9%	12.9%	0.0%
2065	14.1%	14.1%	0.0%
2070	14.1%	14.1%	0.0%
2075	14.1%	14.1%	0.0%

[a] This assumes an average overrun account balance of 66 KAF

3

Table 3.12-7. Probability of Excess Flows Greater than 1 MAF, Comparison of No Action and Combined IA & IOP Assuming Average Overrun Account Balance [a]

Selected Year	*No Action*	*IA and IOP*	*Difference*
2002	0.0%	0.0%	0.0%
2003	9.4%	9.4%	0.0%
2004	14.1%	12.9%	1.2%
2005	12.9%	12.9%	0.0%
2006	12.9%	12.9%	0.0%
2007	18.8%	16.5%	2.4%
2008	16.5%	16.5%	0.0%
2009	14.1%	14.1%	0.0%
2010	11.8%	10.6%	1.2%
2011	14.1%	14.1%	0.0%
2012	12.9%	12.9%	0.0%
2013	14.1%	12.9%	1.2%
2014	11.8%	10.6%	1.2%
2015	10.6%	10.6%	0.0%
2016	15.3%	15.3%	0.0%
2020	14.1%	14.1%	0.0%
2025	11.8%	11.8%	0.0%
2030	10.6%	9.4%	1.2%
2035	8.2%	8.2%	0.0%
2040	8.2%	8.2%	0.0%
2045	8.2%	8.2%	0.0%
2050	5.9%	5.9%	0.0%
2055	9.4%	9.4%	0.0%
2060	8.2%	7.1%	1.2%
2065	7.1%	5.9%	1.2%
2070	7.1%	7.1%	0.0%
2075	7.1%	7.1%	0.0%

[a] This assumes an average overrun account balance of 66 KAF

Figure

3.12-8 Comparison of Excess Flow Magnitude, No Action, IA, and Combined IA & IOP for Years 2006 and 2016 Assuming Average Overrun Account Balance

Figure

3.12-9 Comparison of Excess Flow Magnitude, No Action, IA, and Combined IA & IOP for Years 2026 and 2050 Assuming Average Overrun Account Balance

Table

3.12-8. Excess Flows Below Morelos Dam for Select Years Relative to the No Action

One page landscape

percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF.

In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered a Lower Basin Overrun Account Balance of 331 KAFY modeled conditions, approximately 11.7 percent of instances where differences were observed, the differences were positive which represented increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF.

A decrease in the probability and magnitude of flood flows is not an adverse impact to hydrology. The effects of these changes to biological resources are described below.

Water Quality. As described in section 3.1.2, modeling of potential changes in salinity indicated that the IA could result in increased salinity of up to 8 mg/L at Imperial Dam. However, it is assumed that additional salinity control measures would be implemented and water quality objectives would be met; the greater, albeit minor, salinity levels anticipated under the IA could require that salinity control measures be implemented on a different schedule than would be necessary under No Action.

MITIGATION MEASURES

No mitigation measures are proposed.

RESIDUAL IMPACTS

No residual impacts would occur.

Alternative to the Inadvertent Overrun and Payback Policy

NO FORGIVENESS DURING FLOOD RELEASE ALTERNATIVE

Neither the proposed inadvertent overrun and payback policy nor this alternative applies to Mexico. However, actions undertaken by IOP users with this alternative could affect excess flows to Mexico. Under this IOP alternative, overrun accounts would not be forgiven in the event of a flood control release. All overrun water taken from the system would be paid back. In the long term there would be no net loss to system storage.

In any given year it is the account balance that represents water that has been borrowed from the system. This borrowed water would not contribute to excess flows. In most respects, therefore, the proposed action and "No Forgiveness Alternative" are nearly identical, although with "No Forgiveness" payback periods, and thus periods of reduced flow and reduced river stage, could be extended relative to the proposed action. The exact increase in the number of potential payback years is uncertain, again dependent upon a flood event coinciding with a period when entities have overrun account balances. Overall, the effect of overrun account forgiveness would primarily impact the "persistence" of account balances, not the maximum of those balances.

Modeling of the "No Forgiveness" alternative showed that paybacks after a flood control event would not greatly impact long-term reservoir storage or magnitude of excess flows to Mexico. This is because most of the payback required after a flood event would later be released as surplus water, rather than staying in the reservoir and augmenting a later flood flow. Because this "screening" modeling showed that the "No Forgiveness" option varied so little from the "With Forgiveness" IOP alternative, detailed modeling was not performed.

Water Quality. Changes to water quality for the No Forgiveness Alternative are the same as for the IOP, described above.

MITIGATION MEASURES

No mitigation measures are proposed.

RESIDUAL IMPACTS

No residual impacts would occur.

3.12.2 Biological Resources

Affected Environment

This section focuses on potentially affected species that occur in Mexico and are federally listed as endangered under the ESA. These are the desert pupfish (*Cyprinodon macularius*), vaquita (*Phocaena sinus*), totoaba (*Totoaba mcdonaldi*), southwestern willow flycatcher (*Empidonax traillii extimus*), and the Yuma clapper rail (*Rallus longirostris yumanensis*). The vaquita and totoaba occur only in Mexico. The desert pupfish and the two bird species occur in both the U.S. and Mexico; potential impacts to these species and their habitat within the U.S. are discussed in section 3.2 (biological resources). Below is further discussion of the habitat and the above-named species in Mexico.

Habitat

COLORADO RIVER FROM NIB TO THE DELTA

Human activities have significantly changed the Colorado River ecosystem since the early 1900s. Development of the Colorado River Delta in Mexico started in the late 1800s with the advent of cattle grazing. Irrigation development on a significant scale started in 1901 when the California Development Company constructed a series of canals and ditches from the Colorado River near Yuma to the Imperial Valley. The California Development Company constructed the Alamo Canal, which traversed a portion of Mexico before entering the U.S. The Mexican government required that 50 percent of the water that was transported through the canal be available to Mexican interests. By 1934 approximately 134,000 acres of land were irrigated in the Delta. By 1940 that figure had increased to approximately 278,000 acres. With the completion of Morelos Dam in 1950 and the beginning of irrigation from deep wells, approximately 359,000 acres were being farmed. By the end of the 1950s, the amount of acreage irrigated from the Colorado River peaked at approximately 476,000 acres. The effect of agricultural development in the Mexicali Valley resulted in a major reduction in native vegetation. Control of the Colorado River has made flooding along the river an infrequent event. This in turn affects riparian vegetation establishment. The existing riparian vegetation is sustained by groundwater, excess flows, and/or return flows from agriculture.

A 1997 survey of floodplain vegetation along the lower portion of the Colorado River (CH2MHill 1997) classified 88 percent of over 4,300 acres from the NIB to the SIB as salt cedar. Salt cedar (also commonly referred to as tamarisk) is an exotic species that appeared along the mainstem Colorado River in about 1920 (Ohmart et al. 1988) and has displaced native riparian species throughout the lower portion of the Colorado River. Cottonwood-willow communities were mapped in only 7.5 percent of the area, and the historically common and large marshes comprised only 3.5 percent of the habitat communities mapped by CH2MHill.

The most current information available on the vegetation composition present along the Colorado River floodplain between the SIB and the Rio Hardy River comes from a 1999 study conducted by the University of Monterrey (Guaymas), the University of Arizona, the Environmental Defense Fund, and the Sonoran Institute (Glenn, unpublished data; Luecke et al. 1999). Aerial and remote sensing methods, combined with ground surveys to check accuracy, were used to estimate the number of acres of various habitat types. Habitat types were separated into two broad categories: (1) areas where Fremont cottonwoods and Goodding willow comprised greater than 10 percent of the stand (determined by measuring percent vegetation cover by using remote sensing techniques); and (2) areas where Fremont cottonwoods and Goodding willows comprised less than 10 percent of the stand. In stands where cottonwoods and willows comprised greater than 10 percent of the vegetation cover, the stands were further subdivided by highest class and density (open gallery forest, closed gallery forest, and shrub dominated). In stands where cottonwoods and willows comprised less than 10 percent of the vegetative cover, the stands were further divided by species composition (salt cedar/arrowweed and salt cedar/mesquite).

The University of Monterrey study estimated approximately 9,545 acres of greater than 10 percent cottonwood-willow habitat, 4,492 acres classified as open gallery forest and 5,053 acres classified as shrub dominated. Analysis of tree ring data indicated that the majority of these cottonwood-willow stands had been regenerated during high flow events over the last two decades, especially the 1993 Gila River flood event. The University of Monterrey study also identified 25,829 acres of salt cedar/arrowweed habitat. Although the study does not specify, it is likely that these stands were actually monotypic salt cedar and monotypic arrowweed stands or clumps since arrowweed does not usually grow as a mixed stand with other vegetation types.

In December of 1998, biologists from Reclamation, San Bernardino County Museum, and the Upper Gulf of California and Colorado River Delta Biosphere Preserve conducted an aerial survey of the Rio Hardy and the Colorado River to determine potentially suitable southwestern willow flycatcher breeding habitat. This survey noted that the vegetation at the confluence of the Rio Hardy and Colorado River was mostly narrow, dry stands of salt cedar. Northeast of the town of Venustiano Carranza, patches of Gooding willow and Fremont cottonwood were evident. Approximately 5 kilometers north of the Mexican Railroad crossing of the Colorado River, the River contained long linear stands of Goodding willow with a few cottonwoods also present. Approximately 15 kilometers south of San Luis, Sonora, the Colorado River begins to broaden out and from this point north to the NIB, a variety of habitats believed to be suitable breeding habitat for southwestern willow flycatcher were present (McKernan 1999).

The lower portion of the Colorado River supported a large estuary at its mouth in the Sea of Cortez. The historic lower portion of the River exhibited the typical annual fluctuations in flow with the peak flows generally occurring in the spring to early summer. These flows carried nutrients and sediments into the estuary, creating the conditions suited for various phases of the life history of the endemic species.

The upper end of the Sea has remarkably changed due to the lack of annual inflow from the lower portion of the Colorado River, following the construction of dams and water diversions upstream. In recent years, there have been only three events of note that have resulted in large quantities of water reaching the estuary from the lower portion of the Colorado River. High flows were experienced on the lower portion of the Colorado River during flood control operations from 1983 through 1987, and flows from the Gila River through the lower portion of the River reached the estuary in 1993. There were space building flows and flood control releases in seven months of 1997, eight months in 1998, and the winter and fall of 1999. All but the flows of 1983-85 and 1993 probably had little effect on the Sea of Cortez. Therefore, the hydrology of the estuary is primarily dominated by tidal processes, and sediment contribution to the estuary is a result of erosion of the Delta itself (Carriquiry and Sanchez 1999).

In spite of the reduced inflow from the lower portion of the Colorado River, the estuary is extremely rich in nutrients, with the corresponding richness of plankton, leading to rich amounts of organisms on up the food chain. High chlorophyll values are found in the estuary typical of very rich coastal waters (Santamaria-Del-Angel et al. 1994). Zooplankton biomass values are similar to those of the rich central Sea of Cortez, and the values for the channels around Montague Island (Farfan and Alvarez-Borrego 1992). The nutrient inflow is primarily a result of agriculture drainage into the Rio Hardy, which joins the lower portion of the Colorado River immediately above the Sea.

CIENEGA DE SANTA CLARA

The Cienega de Santa Clara (Cienega) is a large wetland complex located northeast of the mouth of the lower portion of the Colorado River in Sonora, Mexico. It is a large basin approximately 80,000 acres in size, including roughly 9,700 vegetated. The area south of the vegetated portion of the Cienega consists of highly saline tidal salt flats. The open water portion of the area varies, depending on amount of water that comes from the Sea of Cortez. The open water area of the Cienega is characterized by hypersaline water (greater than 60,000 ppm). The Cienega is typically included in discussions of the region of the Colorado River from the Rio Hardy confluence to the Sea of Cortez. Because flows into the Cienega are from the Main Outlet Extension Drain (MODE) and the Riito Drain and the Cienega is not connected to the floodplain of the Colorado River, natural and physical resources located within the Cienega are not anticipated to be affected by the adoption of the proposed action.

United States Special Status Species in Mexico

DESERT PUPFISH

The desert pupfish (*Cyprinodon macularius*) is a small killifish with a smoothly rounded body shape. Desert pupfish inhabit desert springs, small streams, creeks, marshes and margins of larger bodies of water. The fish usually inhabit very shallow water, often too shallow for other fishes. Present distribution of the subspecies *C. m. macularius* includes natural populations in at least 12 locations in the U.S. and Mexico, as well as over 20 transplanted populations.

One of the natural populations in Mexico is in the Cienega. The area is about 90 percent unvegetated salt flats with a number of small marsh complexes along the eastern edge of the bowl where it abuts an escarpment. The area is not directly connected to either the Colorado River or the Gulf (Sea of Cortez); however, extreme high tides result in the lower half of the basin becoming inundated to a level of one foot or less of salt water from the Gulf. The marsh areas on the east side are small and are spring fed. The largest marsh complex is on the northeast side where two agricultural drains provide relatively fresh water inflows. The desert pupfish occur in a number of these marsh complexes.

Reclamation biologists discovered this population of desert pupfish in 1974 during pre-project investigations for a feature of the Colorado River Basin Salinity Control Project. At that time, inflow to the Cienega was by agricultural return flows from the Riito Drain in Mexico, which provided about 35 cfs flow. The project feature being investigated was construction of a bypass canal for drain water from the Wellton-Mohawk Irrigation and Drainage District.

Desert pupfish were found in the marsh along with mosquito fish, sailfin mollies, carp and red shiners. The bypass canal was completed in 1978 and provided a steady flow of over 150 cfs to the marsh. Based upon aerial surveys, the added inflow caused the marsh to grow from an estimated 300 acres of vegetated area in 1974 to roughly 10,000 acres in 1985. Outflow from the Cienega occurs only during the highest tides. The main outflow is through evaporation, which has resulted in the hypersaline conditions in the lower basin. Recent aerial surveys show that while the inflows have continued, the marsh has not continued to grow in size. A small number of desert pupfish continue to exist in the marsh. The fish tend to inhabit the shallow edges of the marsh in vegetated areas. Desert pupfish from the Cienega were transported to Dexter National Fish Hatchery during May 1983, and many of the transplanted populations in the U.S. are of this subspecies and stem from this initial transplant.

VAQUITA

The vaquita (*Phocaena sinus*) is a small porpoise and is widely believed to be the most endangered marine cetacean in the world (Klinowska 1991; Taylor and Gerrodette 1993). It is also the only endemic species of marine mammal from the Gulf.

The vaquita was listed as "vulnerable" in 1978 by the IUCN-The World Conservation Union [formerly the International Union for Conservation of Nature and Natural Resources (IUCN)] in their Red Data Book and also in the Mexican list of wild vertebrates in danger of extinction. The vaquita was also listed in Appendix I of the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora on 28 June 1979, and in February 1985 as an endangered species under the ESA. Recently, this porpoise was classified as "endangered" in the IUCN Cetacean Red Data Book.

The vaquita is very similar in external morphology to the harbor porpoise (*Phocaena phocaena*). Based on a very small sample and a maximum recorded total length of about 5 feet, the vaquita may be the smallest of all the delphinoids (Brownell et al. 1987). The pectoral fins are larger and the dorsal fin is higher proportionally to the body length than in any other extant porpoise species (Brownell et al. 1987).

The range of the vaquita is restricted to the northwestern corner of the Gulf of California, Mexico (Jaramillo-Legorreta et al. 1999), representing the most restricted range for any cetacean species (Ramirez 1993). Stranding data, mortalities in fishing nets and sightings of live animals all confirm that the present distribution of vaquita is concentrated in a small area near Rocas Consag in the northwestern Gulf of California (Gerrodette et al. 1995). Sightings outside of this region (south of 30E 45′ N latitude) may represent occasional departures by some individuals from the center of distribution (Silber and Norris 1991) or temporary extensions in distribution due to climatic changes (Vidal 1990). The region south of Puerto Penasco, Sonora, Mexico, remains insufficiently monitored to further increase the accuracy of population estimates and to establish the southern limit of the geographic range of the species (Ramirez 1993). The range of the vaquita overlaps that of the endangered totoaba, to which it may be linked ecologically (Ramirez 1993).

The vaquita is particularly vulnerable to incidental mortality in gillnets. The vaquita has probably been incidentally caught in gillnets since the mid-1920s. It can be assumed the significant expansion of the fishing industry during the early 1940s further reduced the population (Vidal 1995). Vaquita bycatch in gillnet fisheries was identified as a defining factor which may drive the species to extinction. The total estimated incidental mortality caused by the fleet of El Golfo de Santa Clara was 39 vaquitas per year, over 17 percent of the most recent estimate of population size. El Golfo de Santa Clara is one of three main ports that support gillnet fisheries throughout the range of the vaquita. The fishing effort for San Felipe, Baja California appears to be similar to that of El Golfo de Santa Clara, suggesting that this estimate of incidental mortality of vaquitas represents a minimum (D'Agrosa et al. 2000). Ramirez (1993) identified three actual and potential impacts to the vaquita: incidental mortality caused by fishery activities, reduced Colorado River flows into the Gulf of California and pollution from various sources associated with Colorado River flows into the Gulf.

TOTOABA

The totoaba (*Totoaba macdonaldi*) is a fish endemic to the Gulf of California. In 1976 the species was listed as threatened under CITES. On May 21, 1979, the totoaba was listed in the U.S. as endangered pursuant to the ESA (44 FR 99).

Totoaba are large schooling fish that undertake a seasonal migration within the Gulf and may live to 25 years of age (Cisneros-Mata et al. 1995). Totoaba are the largest of the sciaenid fish, with a maximum reported weight of over 100 kg and a length of over 2 meters (Flanagan and Hendrickson 1976). Adults spawn in the shallow waters of the Colorado River Delta in the upper Gulf where they remain for several weeks before migrating south. Spawning originally occurred from February through April (Cisneros-Mata et al. 1995). Juveniles are thought to emigrate south after spending two years in the upper Gulf, which is considered their nursery ground (Flanagan and Hendrickson 1976).

The totoaba is thought to have ranged from the mouth of the Colorado River to Bahia Concepcion on the west coast of the Gulf and to the mouth of the El Fuerte River in the east (Jordan and Everman 1896 *cited in* Berdegue 1955). Historically, millions of totoaba migrated north in the spring to spawn at the mouth of the Colorado River (Gause 1969).

A more thorough description of the life history of the totoaba is found in Cisneros-Mata et al. (1995).

Cisneros-Mata et al. (1995) concluded that a negative impact due to decreased flow from the Colorado River may be questionable because the claimed effects would have caused extinction of totoaba over 40 years time. Flanagan and Hendrickson (1976) concluded that recruitment and over-fishing explained the decline better than habitat alteration. It is estimated that a steady flow of water reaching an annual total of 1.6 MAF would be necessary to restore the brackish water conditions that historically occurred in the estuary (Reclamation file data). Even if that amount of water were available at present, Reclamation has no control over Colorado River water once it reaches the NIB.

SOUTHWESTERN WILLOW FLYCATCHER

Willow flycatchers (*Empidonax traillii extimus*) are found throughout North America and are further divided taxonomically into four subspecies, *E. t. brewseri*, *E. t. adastus*, *E. t. traillii*, and *E. t. extimus*. The latter, *E. t. extimus*, the southwestern willow flycatcher, breeds on the lower portion of the Colorado River and its tributaries (McKernan et al. 1996, 1997, 1998, 1999, 2000). On February 27, 1995, FWS listed the southwestern willow flycatcher as an endangered species (60 FR 10694). FWS has not issued a recovery plan to date and the designated critical habitat does not include the lower portion of the Colorado River (60 FR 10694).

Southwestern willow flycatchers nest in riparian habitat characterized by dense stands of intermediate-sized shrubs or trees. Most southwestern willow flycatcher nests are located in the fork of a shrub or tree from 4 to 25 feet above the ground (Unitt 1987; Sogge et al. 1997a). These trees are either in or adjacent to soils that are either saturated or have surface water (Phillips et al. 1964; Muizieks et al. 1994; McKernan 1998). The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian habitat, catching insects in the air or gleaning them from the surrounding foliage. It also forages along water edges, backwaters, and sandbars adjacent to nest sites. Details on specific prey items can be found in Drost et al. (1998). On the lower portion of the Colorado River, southwestern willow flycatchers begin arriving at breeding territories in early May and continue to be present until August, with some records into early September (McKernan 1998). Recent studies have documented nest building as early as May 1 (McKernan 1997) and fledging dates as late as September 9 (McKernan 1998).

Breeding range for the southwestern subspecies of the willow flycatcher (*E. t. extimus)* extends from extreme southern Utah and Nevada, through Arizona, New Mexico, and Southern California, but records from west Texas and extreme northern Baja California and Sonora, Mexico remain lacking to date (Unitt 1987). Molina (1998) observed the species in exotic plantings in the El Golfo de Santa Clara fishing village, and in the salt cedar-mesquite-acacia woodland corridor along the pozos near El Doctor in 1997. The species has also been documented at El Doctor wetlands, Colorado River Delta, Sonora, Mexico June 7 and 8, 1999 (Hinojosa-Huerta 2000). These sightings confirm that the area is used for migration, but does not confirm breeding. The presence of the subspecies after June 15 is required to confirm breeding (Soggee et al. 1997; Braden and McKernan 1998). A survey for southwestern willow flycatcher was conducted on the Cocopah Indian Reservation near Yuma, Arizona in 2000. Twenty-six birds were detected on May 22 and June 6, 2000, and none later. It was concluded the riparian habitat on the Reservation was being used as a stopover area during the migration (Garcia-Hernandez et al. 2000).

The majority of southwestern willow flycatchers found during the past five years of surveys on the lower portion of the Colorado River have been found in salt cedar (*Tamarix ramosissima*) or a mixture of salt cedar and native cottonwood and willow, especially Gooddings willow (*Salix gooddingii*) coyote willow (*S. exigua)* and Fremont cottonwood *(Populus fremontii)*. Based on available information at the time of this writing, aside from this general description, no clear distinctions can be made based on perennial species composition or foliage height profiles, as to what constitutes appropriate southwestern willow flycatcher habitat. Due to the difficulty in determining the presence of this species in dense habitat, their presence should not be ruled out until surveys have been conducted if habitat meeting the general description given above is present.

Historically, the southwestern willow flycatcher was widely distributed and fairly common throughout its range, especially in Southern California and Arizona (Unitt 1987; Schlorff 1990). Nest and egg collections by Herbert Brown suggest that the southwestern willow flycatcher was a common breeder along the lower portion of the Colorado River near Yuma in 1902 (Unitt 1987).

Grinnell (1914) also believed that the southwestern willow flycatcher bred along the lower portion of the Colorado River due to the similarities in habitat between this area and other known breeding sites. He noted the abundance of southwestern willow flycatchers observed in the willow association and possible breeding behavior. However, the date of his expedition corresponds more to the migration season of the southwestern willow flycatcher with only a small overlap with the beginning of the breeding season.

In 1993, the FWS estimated that only 230 to 500 nesting pairs existed throughout its entire range (58 FR 39495). However, since extensive surveying has been implemented, this number has likely increased, especially on the lower portion of the Colorado River where the species was thought to have been extirpated (Hunter et al. 1987b; Rosenberg et al. 1991; McKernan and Braden 1999). Sixty-four nesting attempts were documented on the lower portion of the Colorado River from southern Nevada to Needles, California in 1998 (McKernan and Braden 1999).

Presence/absence surveys for willow flycatcher were conducted during 1999, 2000, and 2001 in the Delta. Nine willow flycatchers were detected in 1999 and 41 were detected in 2000 (Garcia Hernanadex, et al., 2001). Sixty-three willow flycatchers were detected in 2001 (Hinojosa-Huerta), et al., 2001 unpublished information). All of the flycatchers detected were apparently migrant birds. All willow flycatchers were found on vegetation associations dominated by cottonwood-willow, except for birds detected at El Doctor, where the vegetation was dominated by dense stands of saltcedar.

Several factors have caused the decline in southwestern willow flycatcher populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agriculture and urban development, mining, road construction, and overgrazing (Phillips et al. 1964; Johnson and Haight 1984; Unitt 1987; Rosenberg et al. 1991; Sogge et al. 1997a). The total acreage of riparian vegetation has changed little in the last 20 years (Anderson and Ohmart 1976; Younker and Anderson 1986), although there is less native vegetation and more non-native present (Rosenberg et al. 1991). The most recent estimate of historical, potentially suitable willow flycatcher habitat as delineated from 1938 aerial photography from the Grand Canyon to Mexico is 89,203 acres (USBR 1999d). Only some portion of this potentially suitable habitat can be assumed to be suitable habitat for the flycatcher, as the microclimate and other factors required which existed at the time are undeterminable. The total amount of occupied habitat for willow flycatchers along the lower portion of the Colorado River in the U.S. is estimated to be slightly over 6,000 acres (USBR 1999). A certain amount of habitat that apparently has the necessary components to be utilized as breeding habitat is not always being used (McKernan and Braden 1998). This could indicate that lack of breeding habitat may not be what is limiting the southwestern flycatcher's population.

YUMA CLAPPER RAIL

Yuma clapper rails (*Rallus longirostris yumanensis*) are federally endangered. They are found in emergent wetland vegetation such as dense or moderately dense stands of cattails (*Typha latofolia* and *T. domingensis*) and bulrush (*Scirpus californicus*) (Eddleman 1989; Todd 1986). They can also occur, in lesser numbers, in sparse cattail-bulrush stands or in dense reed (*Phragmites australis*) stands (Rosenberg et al. 1991). The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway et al. 1993). Annual fluctuation in water depth and residual marsh vegetation are important factors in determining habitat use by Yuma clapper rails (Eddleman 1989).

Yuma clapper rails may begin exhibiting courtship and pairing behavior as early as February. Nest building and incubation can begin by mid-March, with the majority of nests being initiated between late April and late May (Eddleman 1989; Conway et al. 1993). The rails build their nests on dry hummocks, on or under dead emergent vegetation and at the bases of cattail or bulrush. Sometimes they weave nests in the forks of small shrubs that lie just above moist soil or above water that is up to about two feet deep. The incubation period is 20-23 days (Ehrlich et al. 1998; Kaufman 1996) so the majority of clapper rail chicks should be fledged by August. Yuma clapper rails nest in a variety of different microhabitats within the emergent wetland vegetation type, with the only common denominator being a stable substrate. Nests can be found in shallow water near shore or in the interior of marshes over deep water (Eddleman 1989). Nests usually do not have a canopy overhead as surrounding marsh vegetation provides protective cover.

Crayfish (*Procambarus clarki*) are the preferred prey of Yuma clapper rails. Crayfish were introduced into the lower portion of the Colorado River about 1934. This food source and the development of marsh areas resulting from river control such as dams and river management helped to extend the breeding range of the Yuma clapper rail. The original range of the Yuma clapper rail was primarily the Colorado River Delta. The southernmost confirmed occurrence of Yuma clapper rail in Mexico was three birds collected at Mazaltan, Sinoloa; Estero Mescales, Nayarit; and inland at Laguna San Felipe, Puebla (Banks and Tomlinson 1974).

Crayfish comprise as much as 95 percent of the diet of some Yuma clapper rail populations (Ohmart and Tomlinson 1977). Availability of crayfish may be a limiting factor in clapper rail populations and is believed to be a factor in the migratory habits of the rail (Rosenberg et al. 1991). Eddleman (1989), however, has found that crayfish populations in some areas remain high enough to support clapper rails all year and that seasonal movement of clapper rails can not be correlated to crayfish availability.

One issue of concern with the Yuma clapper rail is selenium. Eddleman (1989) reported selenium levels in Yuma clapper rails and eggs and in crayfish used as food were well within levels that will cause reproductive effects in mallards. Rusk (1991) reported a mean of 2.24 ppm dry weight selenium in crayfish samples from six backwaters in the lower portion of the Colorado River from Havasu National Wildlife Refuge, near Needles, California to Mittry Lake, near Yuma, Arizona. Over the past decade, there has been an apparent two to five fold increase in selenium concentrations in crayfish, the primary prey species for the Yuma clapper rail (King et al. 2000). Elevated concentrations of selenium (4.21 – 15.5 ppm dry weight) were present in 95 percent of the samples collected from known food items of rails. Crayfish from the Cienega de Santa Clara in Mexico contained 4.21 ppm selenium, a level lower than found in the U.S., but still above the concern threshold. Recommendations from this latest report on the subject conclude that if selenium concentrations continue to rise, invertebrate and fish eating birds could experience selenium induced reproductive failure and subsequent population declines (King et al. 2000).

Yuma clapper rails may be impacted by human disturbance to their preferred habitat. In recent years the use of boats and personal watercraft has increased along the lower portion of the Colorado River. This has led to speculation that the disturbance caused by water activities such as those may have a negative impact on species of marsh dwelling birds.

This subspecies is found along the Colorado River from Needles, California, to the Gulf, at the Salton Sea and other localities in the Imperial Valley, California, along the Gila River from Yuma to at least Tacna, Arizona, and several areas in central Arizona, including Picacho Reservoir (Todd 1986; Rosenberg et al. 1991). In 1985, Anderson and Ohmart (1985) estimated a population size of 750 birds along the Colorado River north of the International Boundary. The FWS (1983) estimated a total of 1,700 to 2,000 individuals throughout the range of the subspecies. Based on call count surveys, the population of Yuma clapper rail in the U.S. appears to be holding steady (FWS, Phoenix, Arizona, unpublished data). Due to the variation in surveying over time, these estimates can only be considered the minimum number of birds present (Eddleman 1989; Todd 1986).

The range of the Yuma clapper rail has expanded in the past 25 years and continues to do so (Ohmart and Smith 1973; Monson and Phillips 1981; Rosenberg et al. 1991; SNWA 1998; McKernan 1999), so there is a strong possibility that population size may increase. Yuma clapper rails are known to expand into desired habitat when it becomes available. This is evidenced by the colonization of the Finney-Ramer habitat management unit in Southern

California. This unit was modified to provide marsh habitat specifically for Yuma clapper rail and a substantial resident population exists there. There is also recent documentation of the species in Las Vegas Wash, Virgin River and the lower Grand Canyon (SNWA 1998; McKernan 1999).

A substantial population of Yuma clapper rail exists in the Colorado River Delta in Mexico. The most current published information on the distribution and abundance of Yuma clapper rail in the Delta is from Hinojosa-Huerta, et al. (2001). During surveys conducted in 1999 and 2000, the maximum population estimate for the Cienega de Santa Clara was 6,629 birds. This was based on detections during the late breeding season in 2000. Birds were also detected in lesser numbers at the Rio Hardy, Rio El Mayor, Laguna del Indio, and El Doctor. As a matter of interest, the researchers found the main source of water supporting habitat for Yuma clapper rails in the Delta is agricultural drainage, the Cienega de Santa Clara and in other areas such a La Mariana Drain, Laguna del Indio, and Camp Rafael, where the drainage comes from the Mexicali Valley.

Environmental Consequences

Impact Assessment Methodology

Transboundary impacts were based on the hydrologic modeling conducted by Reclamation for the proposed action, as described above. This analysis considered any changes in the volume and frequency of flood releases south of the NIB from the IA and IOP. The biological conservation measures would be implemented within the U.S. at least 20 miles north of the NIB; thus, there would be no potential for an adverse impact to Mexico from this action, and it is not discussed below.

No-Action Alternative

It is anticipated that flood flow frequency and quantities would be reduced as additional water is used by the Upper Division States. This may result in some reduction of wildlife habitat through the reduction in flows reaching the Delta area. It is expected, however, that much of the existing habitat would remain as it is since most of the riparian habitat is composed of salt cedar, which would be fed by groundwater. No measurable impact is expected to sensitive marine species is expected.

Proposed Action

IMPLEMENTATION AGREEMENT

The potential for impacts to federally listed species in Mexico from this action was considered during the preparation of the *Supplemental Biological Assessment on Transboundary Effects in Mexico for Proposed Interim Surplus Criteria* (USBR 2001). As discussed above under Hydrology, the IA would result in a flood flow probability and magnitude that are generally equal to, or somewhat greater than the No-Action Alternative. It was therefore concluded that this action would have no potential impact on any federally listed species in Mexico.

ADOPTION OF INADVERTENT OVERRUN AND PAYBACK POLICY

In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, in approximately 16 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF.

In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered a Lower Basin Overrun Account Balance of 331 KAFY modeled conditions, in approximately 11.7 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF.

This decrease would be unlikely to reduce the development of riparian vegetation within the Delta. Potential minor reductions in the frequency of excess flows below Morelos Dam resulting from the IOP would be unlikely to substantively reduce the amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This is particularly true since Reclamation believes that groundwater recharge in these areas is more a result of percolation induced by agricultural irrigation, drainage water, and the more frequent, but lower-volume, excess flows that are attributable to unused water delivery orders (by users in the Lower Division States) that make it past Morelos Dam. Therefore, no substantive impacts to vegetation are anticipated.

It is anticipated that impacts to fish and wildlife species within the Delta area and within the Sea of Cortez would be negligible or non-existent. Habitat is expected to remain much as it is today, as described above, and there would be no appreciable change in habitat quality for fish and wildlife. The IOP would have no impact on special status species.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

Alternative to the Inadvertent Overrun Policy

No Forgiveness During Flood Release Alternative

Impacts would be similar to those of the proposed action.

Mitigation Measures

No mitigation measures are proposed.

Residual Impacts

No residual impacts would occur.

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4.0 OTHER NEPA CONSIDERATIONS

4.1 REGULATORY FRAMEWORK

4.1.1 Federal Statutes and Policies

In compliance with NEPA, this EIS is intended to provide decisionmakers and the public with information regarding the environmental impacts of the proposed action. Project compliance with other environmental laws, rules, and regulations that are applicable to the proposed action is discussed below.

Endangered Species Act of 1973, as amended – Section 7 of the ESA requires Federal agencies to consult with the FWS to ensure that undertaking, funding, permitting, or authorizing an action is not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, as defined under the law. Reclamation initiated consultation with FWS in August, 2000 by transmitting the *Final Biological Assessment for Proposed Interim Surplus Criteria, Secretarial Implementation Agreements for California Water Plan Components and Conservation Measures on the Lower Colorado River (Lake Mead to the Southerly International Boundary)* to FWS and requesting a formal consultation. The BA covered the IA water transfers up to 400 KAFY, as well as adoption of the ISG. FWS issued a Final BO in January, 2001 (a non-jeopardy opinion with reasonable and prudent measures for incidental take). These documents are included in Appendices D and E, respectively, of this EIS. The conservation measures that were developed by Reclamation and modified by FWS to fully reduce the impacts of the proposed water transfers to acceptable levels are included as part of the proposed action in this EIS. The BA and BO cover impacts on the River; any off-River impacts from use of the water are being addressed by HCPs and other plans and programs developed by the water user entities. For example, HCPs (e.g., the CVMSHCP and the San Diego Municipal Habitat Conservation Program) are in preparation and are anticipated to be permitted within the next 3 years (in approximately 2004).

Fish and Wildlife Coordination Act of 1934, as amended – This Act requires coordination with Federal and State wildlife agencies for the purpose of mitigating project-induced losses to wildlife resources. FWS recommendations for mitigating impacts to fish and wildlife resources (other than threatened and endangered species) were requested by Reclamation, but have not yet been received.

National Wildlife Refuge System Administration Act of 1966 (42 U.S.C. 668dd) – This Act provides for the administration and management of the national wildlife refuge system, including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas. The biological conservation measures included as part of the proposed action are consistent with the goals of this Act.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703) – This Act protects migratory birds by limiting the hunting, capturing, selling, purchasing, transporting, importing, exporting, killing, or possession of these birds or their nests or eggs. The specific migratory birds covered are identified in separate agreements between the U.S. and Great Britain, Mexico, and Japan. Subject to limitations in the Act, the Secretary may adopt regulations determining the extent to which, if at all, hunting, capturing, selling, purchasing, transporting, importing, exporting, killing, or possession of these birds or their nests or eggs will be allowed. No such impacts to migratory birds would result from the proposed action. This aspect of the proposed action, including mitigation alternatives that could reduce impacts to migratory birds, is included in the IID Water Conservation and Transfer Project EIR/EIS.

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715) – This Act, which was passed by Congress in 1929, protects migratory birds by creating the Migratory Bird Conservation Commission. The Commission's purpose is to consider and approve the purchase, rental, or other acquisition of any areas of land or water that may be recommended by the Secretary for the purpose of establishing sanctuaries for migratory birds. The establishment of habitat as part of the proposed biological conservation measures would be consistent with this Act.

Bald Eagle Protection Act of 1940 (16 U.S.C. 4901-4918) – The Bald Eagle Protection Act imposes criminal and civil penalties on anyone in the U.S. or within its jurisdiction who, unless excepted, takes, possesses, sells, purchases, barters, offers to sell or purchase or barter, transports, exports or imports at any time or in any manner a bald or golden eagle, alive or dead; or any part, nest or egg of these eagles; or violates any permit or regulations issued under the Act. If compatible with the preservation of bald and golden eagles, the Secretary may issue regulations authorizing the taking, possession and transportation of these eagles for scientific or exhibition purposes, for religious purposes of Indian Tribes or for the protection of wildlife, agricultural or other interests. No adverse impacts to bald eagles would result from the proposed action; thus, it would be consistent with this Act.

Section 176, Clean Air Act (42 U.S.C. 7506) – The primary objective of the Clean Air Act is to establish Federal standards for air pollutants from stationary and mobile sources and to work with the States to regulate polluting emissions. The Act is designed to improve air quality in areas of the country that do not meet Federal standards and to prevent significant deterioration in areas where air quality exceeds those standards. Most emissions related to the proposed action are expected to be minimal and consistent with the standards established by the Clean Air Act. However, it is possible that mitigated emissions from large construction activities proposed within the SCAB project region could exceed air pollutant thresholds established by the SCAQMD, which would not be consistent with the Act. The potential exists for the IID Water Conservation and Transfer Project to produce significant amounts of windblown dust (PM_{10}) from the exposed shoreline of the Salton Sea. If these emissions were to contribute to an exceedance of a PM_{10} ambient air quality standard, they would not be consistent with this Act.

General Conformity Rule, 40 CFR, Part 51, subpart W – This rule requires that Federal projects or projects receiving Federal funding conform to State Implementation Plans developed for the purpose of reaching attainment of national ambient air quality standards. Section 3.11 of this EIS provides an analysis of compliance with the General Conformity Rule.

Clean Water Act of 1972, as amended – Section 404 of the Clean Water Act identifies conditions under which a permit is required for construction projects that result in the discharge of fill or dredged materials into waters of the U.S. Construction activities associated with implementation of the proposed action, including implementation of biological conservation measures may require a permit under Section 404, depending on the location and nature of the construction.

River and Harbor Act of 1899 (33 U.S.C. 401 et seq.) – This Act protects the public's right to free navigation in navigable waters of the U.S. as described by the USACE section 10/404 implementing regulations at 33 CFR Part 329. The Act also prohibits unauthorized construction in navigable waters of the U.S. Reclamation will comply with this order, as necessary, for implementation of the biological conservation measures.

National Historic Preservation Act of 1966, as amended – Federally funded undertakings that have the potential to impact historic properties are subject to Section 106 of the NHPA. Under this Act, Federal agencies are responsible for the identification, management, and nomination to the National Register of Historic Places of cultural resources that would be impacted by Federal actions. Reclamation's compliance with this Act is described in section 3.9.

American Indian Religious Freedom Act (42 U.S.C. 1996) – The American Indian Religious Freedom Act establishes as U.S. policy, the protection and preservation for American Indians of their inherent right to freely believe, express, and practice their traditional religions, which includes, but is not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites. Federal agencies are required to make a good faith effort to learn about Indian religious practices, consult with Indian leaders and religious practitioners and consider any adverse impacts on Indian religious practices during decision making. Implementation of the proposed IA, IOP, and biological conservation measures would not conflict with these requirements.

Native American Graves Protection and Repatriation Act (24 U.S.C. 3001) – Native American Graves Protection and Repatriation Act assigns ownership to Native Americans of human burials and associated grave goods, which are excavated or discovered on Federal or tribal lands. It requires federally sponsored museums to conduct inventories of their collections, and requires a 30-day delay in project work when human remains are discovered on Federal lands. Implementation of the IA and IOP have no potential to disturb human remains or associated grave goods. Further review for compliance of the biological conservation measures would occur prior to their implementation.

Antiquities Act (16 U.S.C. 431) – The Antiquities Act of 1906 provides for the protection of historic and prehistoric remains or any object of antiquity on Federal lands; establishes criminal penalties for unauthorized destruction or appropriation of antiquities; and authorizes scientific investigation of antiquities on Federal land, subject to permit and regulations. The proposed Federal action would be in compliance with this Act.

Archaeological Resources Protection Act (16 U.S.C. 470) – The Archaeological Resources Policy Act of 1979 provides for the protection of archaeological resources on public and Indian lands. Protection of archaeological resources, under the guidelines of this Act, includes consideration of excavation and removal of resources, enforcement of the Act, and confidentiality of information concerning the nature and location of archaeological resources. It also provides substantial criminal and civil penalties for those who violate the terms of the Act. The proposed Federal action would be in compliance with this Act.

Farmland Protection Policy Act of 1981 – The purpose of the Farmland Protection Policy Act is to minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. The Act also stipulates that Federal programs be compatible with State, local, and private efforts to protect farmland. There is a potential for agricultural land to be converted to habitat under the proposed biological conservation measures. IID's water conservation measures include the possibility of fallowing farmland. No other aspects of the proposed action would result in the loss of farmland or the removal of farmland from protection.

Executive Order 11988, Floodplain Management, May 24, 1977 – This Executive Order requires avoiding or minimizing harm associated with the occupancy or modification of a floodplain. The proposed action would involve the creation of backwaters or habitat within the historic floodplain of the lower portion of the Colorado River. No other sites would be biologically suitable for mitigating potential impacts from the IA to threatened and endangered species, and the type of mitigation proposed would not adversely impact the functions of the floodplain.

Executive Order 11990, Protection of Wetlands, May 24, 1977 – This Executive Order provides for protection of wetlands through avoidance or minimization of adverse impacts. As discussed in section 3.2, Biological Resources, the IA has the potential to adversely impact wetlands, although the biological conservation measures identified in this EIS would effectively minimize these impacts.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994 – This order directs agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental impacts of their programs, policies, and activities on minority and low-income populations. As noted in section 3.8 of this EIS, no direct impacts associated with Environmental Justice were identified. An analysis of potential indirect effects that could occur in the IID and Salton Sea areas identified two possible disproportionate effects – one to low-income and Hispanic farm workers that could be displaced by fallowing by IID, and potential disproportionate impacts to Hispanics near the Salton Sea and within the Salton Sea Air Basin from windblown dust from exposed Salton Sea sediments after the year 2030.

Executive Order 13007, Sacred Sites, 1996 – This order requires all Executive Branch agencies that have responsibility for the management of Federal lands will, where practicable, permitted by law, and not clearly inconsistent with essential agency functions, provide access to Indian sacred sites for ceremonial use by Indian religious practitioners and will avoid adversely impacting the integrity of these sites. When possible, Federal agencies must also maintain the confidentiality of sacred sites. Implementation of the IA, IOP, and biological conservation measures would not conflict with the requirements of this Act.

4.2 CUMULATIVE IMPACTS

The Council on Environmental Quality's regulations (40 CFR § 1500-1508) implementing the procedural provisions of NEPA define cumulative impacts as the following:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future

actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

Cumulative impacts refer to two or more individual impacts that, when considered together, are significant or that compound or increase other environmental impacts. Cumulative impacts can be categorized as additive and interactive. An additive impact results from additions from one kind of source either through time or space. An interactive impact results from more than one kind of source.

This section addresses the cumulative impacts of the proposed action combined with other regional water supply or closely related projects in the region. A list approach was used to identify these closely related projects that could result in cumulatively significant impacts. These projects are briefly described below.

4.2.1 Projects Considered in the Cumulative Impact Analysis

Numerous past, present, and reasonably foreseeable projects have been identified due to the large geographic area considered in this EIS. This EIS, however, addresses only those projects that have the potential to contribute to a cumulative impact when combined with the proposed action. The projects considered for cumulative analysis in this EIS are as follows.

Interim Surplus Guidelines

Project Description

As discussed in section 1.2.3, in February, 2001 Reclamation implemented the ISG (formerly referred to as Interim Surplus Criteria), which identify when the Secretary may make Colorado River water available for delivery to the States of Arizona, California, and Nevada in excess of the normal 7.5 MAFY apportionment. These guidelines, which define when surplus water is available for a period of 15 years, were adopted pursuant to Article III(3)(b) of the *Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968* (LROC). The ISG will be in effect through calendar year 2015, for determinations made for calendar year 2016 and applied each year as part of the AOP. The guidelines will be able to afford mainstream users of Colorado River water, particularly those in California who currently utilize surplus water, a greater degree of predictability with respect to the likely existence, or lack thereof, of a Lake Mead surplus determination in a given year. The guidelines will facilitate California's transition to a reduced supply of Colorado River water. A Final EIS has been released that assesses the impacts of these guidelines (USBR 2000) and a ROD has been approved (*Federal Register*, Vol. 66, No. 17, January 25, 2001, Notices).

The ISG is critical to the overall implementation of the IA and QSA since the ISG define the process by which surplus water can be used to partially offset the impact of the reduction of California's use of Colorado River water to the States' normal year level. Implementation of the IA and QSA are critical, as the ISG will stay effective only if the QSA and associate agreements are executed by December 31, 2002, and/or California meets the "benchmark" reductions in Colorado River water use as specified in the ROD. It is anticipated that once the ISG period is completed, California will be able to limit the States' use of Colorado River water to its apportionment of 4.4 MAFY in a normal year without the benefit of special surplus criteria.

With the implementation of the ISG, California has a higher probability of receiving Colorado River water in excess of the State's 4.4 MAF normal year apportionment from 2001 to 2015. After 2016, the likelihood of surplus water being available would be diminished (USBR 2000b). By this time, however, most IA and QSA components would be in place, and the impacted agencies would likely have the capabilities to meet customer water demands within California's allocation of 4.4 MAF.

Environmental Impacts

A ROD was signed in January 2001, and the ISG became effective on February 25, 2001. Reclamation determined that the small changes in probabilities of occurrence of flows that could impact some resources are within Reclamation's current operational regime and authorities under Federal law. Specific mitigation measures were identified for threatened and endangered species (razorback sucker and other native fish) through the 2000 BA, which also addressed the IA water transfers.

Lower Colorado River Multi-Species Conservation Program

Project Description

The MSCP is described in section 1.5. The IA is one of the projects whose impacts to the lower portion of the Colorado River is covered by the MSCP.

Environmental Impacts

An EIS/EIR and BA are being prepared to analyze the impacts of the program. Reclamation and FWS are the lead agencies under NEPA, and MWD is the lead agency under CEQA.

The MSCP is intended to have a beneficial impact on habitat along the lower portion of the Colorado River. Although impacts from the MSCP are yet to be identified, it is likely that most impacts will consist of short-term, localized construction impacts, which may include impacts to air quality, noise, water quality, geology and soils, and biological resources. Long-term impacts may include the removal of agricultural land from production and impacts to cultural resources, depending on the location of the sites selected for restoration. The MSCP was not included in the cumulative impact modeling analysis because none of the conceptual 'covered' projects are proposed and considered reasonably foreseeable from a NEPA perspective.

Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program

Project Description

This program is described in section 1.5.

Environmental Impacts

An Draft EIR assessing the impacts of this program has been prepared by PVID. Environmental impacts are speculative at this time, but are expected to primarily be long-term changes associated with hydrology, water supply, and socioeconomics. This program would require the change in point of diversion of Colorado River water of up to 111 KAFY from Palo Verde Diversion Dam to Lake Havasu, resulting in less flow in the reach from Parker Dam to Palo Verde Diversion Dam. These impacts could be additive to the water transfers described in this EIS, or could substitute for a portion of the transfers if they are not fully implemented. Reclamation's cumulative analysis of River impacts (Tables 4.2-1 and 4.2-2) included this transfer. The Palo Verde Valley has no hydrologic connection to the Salton Sea and thus a decrease in water applied to the PVID service area would not impact inflow to the Sea (personal communication, Jan Matusak, MWD, December 10, 2002).

All-American Canal Lining

Project Description

This project is described in general terms in sections 1.5 and 1.6.

IID obtains water from the 82-mile long AAC, which diverts water from the Colorado River at Imperial Dam. The preferred alternative identified in the Final EIS/EIR for the All-American Canal Lining Project (USBR and IID 1994) is to construct a new, parallel canal from one mile west of Pilot Knob to Drop 3, a distance of 23 miles. The centerline of the new canal would be offset from the old centerline of the original canal by a distance of 300 to 600 feet, depending on terrain, ease of construction, and location of existing structures. Operation and maintenance roads would be 20 feet wide to match existing canal roads.

Excavation of 25 million cubic yards of earth would be required. Excess material would be placed in rows along the new canal. An estimated 530 acres of new right-of-way would be required, all of which is under Federal control. Other land disturbances would include a 10-acre concrete batch plant and three, 5-acre staging areas, all of which would be on previously disturbed lands. Power lines would be relocated as required. Actual construction would last approximately three years.

A variety of mitigation measures have been incorporated into the project, including establishing 43 acres of honey mesquite and cottonwood/willow and one acre of marsh, restoring shelter for juvenile fish by constructing artificial reefs in the canal, replacing and protecting habitat for special status species and to help maintain the fishery for recreational fishing, and avoiding cultural resources sites where feasible.

The canal would be in service year-round, as at the present, and would be operated at as high a water level as possible to maximize power generation at the drop structures. The old canal would be retained for emergency use. Pending final design, the canal lining project could reduce the regulatory storage capacity.

Environmental Impacts

A Final EIS/EIR for the All-American Canal Lining Project was released in March 1994. Environmental impacts were identified in the following areas: groundwater, water quality, biological resources (wetland habitat including wetlands along the canal and along the impacted reach of the Colorado River, terrestrial habitat, and special status species), canal fisheries, air quality, cultural resources, hydroelectric power, and socioeconomics. A ROD was prepared and signed by the Lower Colorado Region's Regional Director on July 29,1994. On November 22, 1999, Reclamation determined that the EIS and ROD continued to meet the requirements of NEPA.

Coachella Canal Lining Project

Project Description

This project is discussed in general terms in sections 1.5 and 1.6.

CVWD obtains water from the 122-mile long Coachella Canal, which diverts water from the AAC. The preferred alternative identified in the Final EIS/EIR for the Coachella Canal Lining Project (USBR and CVWD 2001) is to line the existing unlined section of the canal using conventional construction methods while diverting water around each section. Lining would occur between siphons 7 and 14 and siphon 15 and 32, a distance of approximately 33 miles.

Other land disturbances associated with construction would include a 10-acre concrete batch plant and one 5-acre staging area. Existing, unpaved roads would be used for construction activities. Actual construction would take two years. The lined canal would continue to be operated on a year-round basis.

Environmental Impacts

A revised and updated Draft EIS/EIR for the Coachella Canal Lining Project was circulated for public review by Reclamation and CVWD in September 2000; a Final EIS/EIR was released in April 2001, the FEIR was certified by CVWD in May 2001, and a ROD was signed March 27, 2002. Environmental impacts were identified in the following areas: biological resources (including marsh/aquatic, desert riparian, and terrestrial habitat, along with special status species), large mammal escape, canal fisheries, cultural resources, and air quality.

Rule for Offstream Storage

Proposed Project

This project is described in section 1.2.3.

Environmental Impacts

Impacts of this rule were assessed at a programmatic level in an environmental assessment. No significant environmental impacts requiring mitigation were identified, although Reclamation will conduct the appropriate project level of NEPA analysis to identify potential impacts associated with all specific Storage and Interstate Release Agreements when they are presented to the Secretary. Any agreement for offstream storage would require change in points of diversion from the Colorado River. Depending on the entities involved, this change in point of diversion may or may not result in a change in River flows (for example, in the event that MWD and AWBA enter into an agreement for offstream storage, there would be changes in points of diversion from or to the MWD facilities to the CAWCD facilities, although, as both are located in Lake Havasu, there would not be a reduction in River flows; in the event that the SNWA and AWBA enter into an agreement for offstream storage, there would be changes in points of diversion from or to Lake Mead and Lake Havasu, respectively, and a subsequent increase or reduction in river flows between Hoover Dam and Lake Havasu). Arizona State law has established a cumulate annual maximum of 100 KAF of recovery for the States of California and Nevada. Currently, the AWBA is the only storing entity.

Colorado River Basin Salinity Control Program

Project Description

This project is described in section 1.5.2.

Environmental Impacts

To achieve future reduction goals, a variety of salinity control methods are being investigated. Environmental impacts would depend on the methods implemented and site locations. Existing salinity control measures under this program will prevent over a half-million ton of salt per year from reaching the River (DOI 1999).

Coachella Valley Water Management Plan (Non-IA/QSA Part)

Project Description

CVWD prepared the CVWMP (CVWD 2000) to provide an overall program of managing its surface and groundwater resources in the future. The objectives of this plan include eliminating groundwater overdraft and its associated adverse impacts, such as groundwater storage reduction, declining groundwater levels, land subsidence and water quality degradation and maximizing conjunctive use opportunities.

The overall plan involves a number of actions to reduce the current overdraft of groundwater in the Coachella Valley through increased use of Colorado River water (reducing the requirement to pump groundwater) and various recycling and conservation measures to reuse or decrease the consumption of water. The impacts of the overall CVWMP are being addressed in a PEIR currently under preparation by CVWD. A substantial portion of the additional water to be used from the Colorado River is associated with the implementation of the IA and QSA. Other elements of the CVWMP are not dependent upon the implementation of the IA/QSA and are described below. Water would be gained through non-QSA/IA related activities of the CVWMP, including recycled water, desalted agricultural drain water, municipal and industrial conservation, and golf course conservation.

Implementing these elements of the CVWMP would involve construction of various facilities for treatment of water and development of additional policies to implement increased conservation. Implementation of the CVWMP may also result in additional water from other transfers not related to the IA and QSA. This includes a potential transfer of up to 100 KAFY of SWP water.

Environmental Impacts

A Notice of Preparation (NOP) was originally filed with the State Clearinghouse in November 1995. A revised NOP was issued in March 2000 to incorporate the changes to the project brought about by the Colorado River allocation negotiations. The Draft PEIR is scheduled to be released in 2002.

Potential environmental impacts of the CVWMP are speculative, although they are expected to consist of both short-term construction impacts and long-term impacts. Short-term, construction-related impacts might include impacts to biological resources, air quality, transportation, and noise. Other impacts could include increased agricultural return flows and decreased water quality to drains that empty into the Salton Sea from the Coachella Valley, increased salinity in the groundwater, and impacts to biological and cultural resources.

Salton Sea Restoration Project

Project Description

This project is described in section 1.5.2.

Environmental Impacts

A Supplemental Draft EIS/EIR that includes different alternatives and revised modeling and impact analysis is now being prepared. Alternatives that are currently being considered for inclusion in the Supplemental Draft EIS/EIR include No Action; Evaporation Ponds; EES at Bombay Beach; EES at Salton Sea Test Base; Evaporation Ponds and EES; and In-Sea EES in Evaporation Ponds. These alternatives will be presented in an alternatives report (scheduled to be released as early as July 2002) that will be made available to the public in advance of the Supplemental Draft EIS/EIR.

Total Maximum Daily Load Program

Project Description

Pursuant to the requirements of the Clean Water Act, the Colorado River Regional Board identified and ranked "impaired waterbodies" for which TMDLs need to be established. The Board will develop and adopt an Implementation Plan for each TMDL/water body combination and identify implementing actions, monitoring and surveillance for compliance, and technical and economic feasibility. The RWQCB has identified the Salton Sea and its tributaries (i.e., New River, Alamo River, Imperial Valley drains, Palo Verde outfall drain, CVSC) as quality limited waters. The Salton Sea Watershed has also been identified as a priority watershed.

Environmental Impacts

Implementation of the TMDLs is expected to improve the quality of the individual water quality limited waterbodies and the Salton Sea.

Brawley, California Constructed Wetlands Demonstration Project

Project Description

This project is described in section 1.5.2.

Environmental Impacts

Implementation of this project would improve the quality of flow to the Salton Sea from the Imperial Valley. Both wetlands are designed to remove silt from inflows passing through a sedimentation basin and reduce nutrient loads, pesticide/herbicide toxicity, and selenium concentrations as water flows through a series of shallow ponds. Wetlands can remove significant amounts of nitrogen (up to 80 or 90 percent) and less phosphorus (on the order of 30 to 40 percent).

4.2.2 Cumulative Impacts by Resource

Hydrology/Water Quality/Water Supply

As discussed in section 3.1.2, several hydrologic operational scenarios were modeled to evaluate changes to the Colorado River system resulting from implementation of the IA, ISG, and other future actions. Specific to the cumulative analysis were the following scenarios:

- Baseline for Cumulative Analysis (the future assuming that neither the ISG nor water transfers per the IA take place); and
- Cumulative Analysis (the future assuming that the ISG, IA water transfers, and the PVID Land Management, Crop Rotation, and Water Supply Program [PVID Program] take place).

Comparison of the "Baseline for Cumulative Analysis" to the "Cumulative Analysis" scenario will provide a means to evaluate cumulative impacts from past, present, and future actions. Specifically, this comparison will measure the relative impact of the IA, ISG, and the PVID Program. In the following discussions about hydrologic changes, whenever possible changes due to the ISG versus the IA, versus PVID Program actions are differentiated.

Like the proposed action, the Rule for Offstream Storage could impact both flows and reservoir levels within the Colorado River from Lake Powell to the SIB. The exact impacts would depend on the amounts of transferred water and the location of the diversion points impacted. Reclamation analyzed the potential effects of offstream storage and development and release of ICUA on water surface elevations in the riverine reaches and reservoirs of the Lower Colorado River for the proposed storage and interstate release agreement referenced in section 1.2.3. That analysis is included in the EA for the Agreement dated February 17, 2002, that was prepared for the storage and interstate release agreement, and assumes Arizona's or Nevada's unused basic and/or surplus apportionments would be delivered from Lake Mead downstream to Lake Havasu for diversion by CAP intakes, conveyed through CAP facilities, and stored offstream by AWBA. This storing action for the benefit of SNWA would have the same effect on the river as if Arizona was diverting water from Lake Havasu for direct use or storing water for intrastate purposes. The EA released February 17, 2002 for the storage and interstate release agreement states there would be no change in water surface elevations of Lake Mead or the river reaches between Hoover Dam and Lake Havasu. Storage of a maximum of 200 KAFY would be equivalent to a maximum of 0.78 foot of water in Lake Mead. This amount of water released from Hoover Dam and delivered downstream to Lake Havasu for storage in Arizona would be equivalent to the following maximum increments of water in the flow column: 0.24 foot below Hoover Dam, 0.34 foot at Willow Beach, and 0.24 foot at Topock Gorge. The storing action will not change or affect the water surface elevations of Lake Mohave or Lake Havasu as their operational levels are controlled. The storing action would be within normal operating ranges for reservoirs and river reaches. To develop ICUA in the future, Arizona would reduce its order of Colorado River water by the amount requested by Nevada, and that amount would remain in Lake Mead for diversion by SNWA facilities. No change in reservoir operation is needed to develop Arizona ICUA for delivery to SNWA. The ICUA would be within reservoir capacity and would be diverted by SNWA or delivered downstream. Retrieval of the maximum of 100 KAFY of ICUA, from Lake Mead would be equivalent to 0.05 foot of reservoir water. When an amount of ICUA is diverted by SNWA facilities at Lake Mead, there would be an equivalent decrease in flows below Hoover Dam to Lake Havasu. The corresponding maximum decrease in water surface elevation of the river would be 0.12 foot below Hoover Dam, 0.17 foot at Willow Beach, and 0.12 foot at Topock Gorge. The action of retrieving ICUA will not change or affect the water surface elevations of Lake Mohave or Lake Havasu as their operational levels are controlled. This action would be within normal operating ranges for reservoirs and river reaches. The small increments of water nor the decreases in water surface elevations below Hoover Dam are not significant effects on the environment. The FEIS for the ISG and this EIS analyzed proposed depletion schedules that simulate the Colorado River water demands for the Lower Division States during the period of offstream storage from 2002-2016.

Surplus water used to store water offstream for SNWA could cause a minor reduction in the quantity of flood control releases that otherwise might reach Mexico. Reclamation's FPEA for the offstream storage rule, dated November 1999, notes that flood control releases that reach Mexico are in excess of U.S. needs, reflect regional climatic conditions, and are not a guaranteed or dependable water supply below the international boundary. Computer modeling conducted as part of the environmental compliance for the rule projected that offstream storage of 1.2 MAF of water over a 12-year storage period would reduce the average annual quantity of flood control releases available to Mexico by 23 KAFY from 1999-2015. Reclamation does not consider this to be a significant effect on excess flows to Mexico. Modeling for the ISG for the period 2002-2016 indicate the occurrence of excess flows exceeding 250 KAF in any year is 24.5 percent for baseline conditions (one year in four), and 21.3 percent (one year in five) for the ISG period. The Arizona and Nevada apportionments that could be stored for interstate purposes were included in this modeling (FEIS for the Colorado River Interim Surplus Criteria, December 2000). Table 4.2-1 and Table 4.2-2 detail the expected combined impacts of the ISG, IA, IOP, and PVID Program, which would be similar, and in addition, to impacts resulting from the Offstream Storage Rule.

Table 4.2-1. Projected Trends in Reservoir Levels
Baseline for Cumulative Analysis vs. Cumulative Analysis

LAKE POWELL	
	With implementation of the IA, ISG, and PVID actions, Lake Powell water levels would more frequently be lower from year 2002 to year 2025 than under the Baseline for Cumulative Analysis condition. The higher (90th percentile) reservoir levels are similar for both the Cumulative Condition and Baseline for Cumulative. The median (50th percentile) water level of Lake Powell would be lower during and immediately after the interim surplus period but after several decades water levels would be the same as those under baseline conditions. These lower water elevations are due primarily to the ISG (USBR 2000b), offset to a minor degree by the impact of the changes anticipated under the IA. When the reservoir is very low (the 10th percentile) under the cumulative analysis condition, the reservoir could be as much as 12 feet lower than would occur under the Baseline for Cumulative Analysis.
LAKE MEAD	
Elevation to Efficiently Produce Electricity *(1083 feet msl)*	Under the Baseline for Cumulative Analysis, during the years 2002 to 2015 there would be a 95 percent probability that elevations in Lake Mead would be greater than that needed to produce electricity. This would decrease to a 56 percent probability after the year 2015. Under the Cumulative Analysis condition the probability that Lake Mead would be above elevation 1083 is somewhat lower. During the years 2002 to 2015 there would be a 90 percent probability that Lake Mead would be above 1083 msl. This would decrease to a 56 percent of the time after the year 2015. The implications of this impact are addressed in section 4.2, Hydroelectric Power.
Elevation to Support SNWA's 1050 intake	Under the Baseline for Cumulative Analysis, during the years 2002 to 2018, there would be a 100 percent probability that Lake Mead would exceed elevation 1050 feet msl. This would decrease to a 60 percent probability after the year 2018. Trends under the Cumulative Analysis condition are similar, there would be a 100 percent probability, for years 2002 to 2018, that water elevations in Lake Mead would exceed elevation 1050 feet msl; this would decrease to a 60 percent probability after the year 2018. During years 2018 to 2040, under the Cumulative Condition, the probability that reservoir elevations would be above elevation 1050 is less (albeit only slightly) than under the Baseline for Cumulative Analysis. Thus in the Cumulative Analysis condition SNWA's 1050 intake would be less reliable.
Elevation to Support SNWA's 1000 intake	Under the Baseline for Cumulative Analysis, during years 2002 through 2049, modeling shows that there would be a 100 percent probability that Lake Mead levels would be greater than necessary to operate SNWA's second water intake (1000 feet msl). After year 2049, Lake Mead elevation is projected to decline and there would be a 6 percent probability that the reservoir would fall below 1000 feet msl. Under the Cumulative Analysis condition the probability that Lake Mead would be above elevation 1000 is consistently lower. During years 2002 to 2049, under the Cumulative Condition, the probability that reservoir elevations would be above elevation 1000 msl would be 93 percent. This probability would decrease to 85 percent after the year 2049. Thus in the Cumulative Analysis condition SNWA's second intake would be less reliable.
For more information refer to Appendix G.	

Table 4.2-2. Projected Flows of the Lower Portion of the Colorado River Baseline for Cumulative Analysis vs. Cumulative Analysis

(All numbers rounded and in MAFY)

River Reach	
GLEN CANYON TO HOOVER DAM	
	Flows from Glen Canyon Dam to Lake Mead would be reduced, primarily as a result of implementing the ISG (USBR 2000b). The IA partly offsets reduced flow from Glen Canyon to Hoover Dam. Overall releases from Lake Powell are reduced no more than 2 percent from implementation of the IA, ISG, and PVID Program.
HOOVER DAM TO PARKER DAM	
	Annual flow volumes in this reach would be greater under the Cumulative Analysis condition than under the Baseline for Cumulative Analysis condition during the 15-year interim period through 2016. Cumulative Analysis conditions would increase flows above the Baseline for Cumulative Analysis by up to 6 percent. The difference is primarily the result of the ISG on the river system, offset to a minor degree by the impact of the changes anticipated under the IA (USBR 2000b). Beyond the 15-year interim period, the annual flow volumes under the Cumulative Analysis are essentially the same (within 1 percent) as those under the Baseline for Cumulative Analysis conditions.
PARKER DAM TO IMPERIAL DAM	
At Headgate Rock Dam	The modeled annual flow volumes in this reach under the Cumulative Analysis would decline gradually between 2002 and 2016, as the water transfers take effect and certain amounts of California's water are diverted from Lake Havasu rather than at Imperial Dam. Flows would be as much as 499 KAF less. The difference would result primarily from the proposed IA and the proposed 111 KAF PVID Program. The ISG does not impact this reach of the river significantly.
Below Palo Verde Diversion Dam	The modeled annual flow volumes in this reach under the Cumulative Analysis would decline gradually between 2002 and 2016, as the water transfers take effect and certain amounts of California's water are diverted from Lake Havasu rather than at Imperial Dam. For all years modeled, annual flows under the Cumulative Analysis would be less than annual flows under the Baseline for Cumulative Analysis. Flows would be as much as 388 KAF less. The difference would result primarily from the proposed IA. The ISG does not impact this reach of the river significantly.
For more information refer to Appendix C and G.	

Water Quality

In terms of water quality the proposed project could result in higher salinity levels (as much as 1 mg/L) below Hoover Dam and Parker Dam. At Imperial Dam, the IA could result in higher salinity levels, as much as 8 mg/L. Cumulative modeling results show that the combined ISG, IA, and PVID Program would have no significant impact at Hoover Dam and Parker Dam. However, at Imperial Dam, the Cumulative Analysis Conditions would tend to cause a reduction in salinity. In other words, the Cumulative Analysis scenario would reduce the burden on future salinity control projects. These results show that the tendency of the water transfers to increase salinity would be more than compensated for by other actions included in the Cumulative Analysis Conditions.

With implementation of the IA and QSA, IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change (all fallowing, with additional fallowing to compensate for reduced inflows) to a reduction of as much as 300 KAFY. Under the maximum impact scenario (300 KAFY conserved and all transferred out of the valley), the reduced inflow would increase salinity to as high as 163,500 mg/L by the end of the 75 year study period, and reduce water surface elevations to about –250 feet over the same period (personal communication, Paul Weghorst, USBR, 12/03/01). The detailed analysis of the full range of IID's conservation alternatives and their impacts on the Salton Sea may be found in the IID Water Conservation and Transfer Project EIR/EIS. In addition to the water conserved for transfer purposes, additional conservation by IID would be required to comply with IID's Priority 3a cap on diversions and the IOP. These actions could have additional effects on reduced inflow to the Salton Sea. The CVWMP could exacerbate these impacts; while the program would increase agricultural return flows, it would decrease water quality to drains emptying into the Salton Sea.

Programs such as TMDL, the SSRP, the Colorado River Basin Salinity Control Program, and Brawley California Wetland Project would act to ameliorate water quality degradation to the Sea, by removing salts from the Sea itself or by limiting the inflow of salts, pesticides and nutrients from agricultural drains.

Within the CVWD service area, recharge with Colorado River water is anticipated to increase salinity of the Upper Valley aquifer and the salinity of groundwater near recharge basins. Recharge using Colorado River water could also introduce perchlorate to CVWD groundwater. Other projects envisioned in the CVWMP could exacerbate these impacts. Programs such as the Colorado River Basin Salinity Control Program would help ameliorate water quality degradation.

Biological Resources

Colorado River

Implementing the cumulative projects would result in a slight lowering of reservoir levels and River levels below Parker Dam. Most of the impacts to aquatic and riparian vegetation would be associated with the IA and would be realized between Parker Dam and Imperial Dam; these impacts and mitigating conservation measures are documented in the BO for the IA (FWS 2001). There would also be a decrease in water levels from Parker Dam to the Palo Verde Diversion Dam, which would result in more impacts to aquatic and riparian vegetation than anticipated under the IA. The slight decrease in reservoir levels would also have a small impact to fisheries.

Implementation of the MSCP is expected to result in a long-term beneficial impact to fish and wildlife species through the provision of additional habitat. As described under the biological conservation measures component of the proposed action, there may be short-term impacts associated with the actual restoration process, including disturbance to wildlife due to noise and human disturbance as well as potential short term turbidity and sedimentation. Because these impacts would be short term and likely would not occur at the same time and in the same place, they are not considered cumulatively significant.

Reclamation prepared a BA and consulted with FWS as part of the environmental compliance for the Final Rule (Appendix C of Reclamation FPEA for the offstream storage rule, October 1999). The proposed action is consistent with Scenarios 1, 2 and 3 as described and evaluated in the BA. Reclamation concluded that the identified scenarios:

- will have no effect on the American peregrine falcon, bald eagle, desert tortoise, flat-tailed horned lizard, brown pelican, and Colorado squawfish;
- are not likely to adversely effect the razorback sucker, bonytail chub, Yuma clapper rail, or southwestern willow flycatcher. Effects on these species are expected to be discountable or insignificant and a take of the species is not expected to occur; and
- will not adversely modify critical habitat for the razorback sucker and bonytail chub in the Lower Colorado River.

Reclamation also determined that the storage and retrieval scenarios would not inhibit or diminish Reclamation's ability to implement the provisions and terms and conditions of the Biological and Conference Opinion on Lower Colorado River Operations and Maintenance, nor have any effect on the efforts by the LCRMSCP or others to obtain water for fish and wildlife. Reclamation agreed to accelerate conservation efforts for the bonytail chub and manage flood control releases to provide freshening flows through FWS refuges. FWS concurred with Reclamation's determinations of effect during informal consultation for the Final Rule concluded on August 19, 1998 (Appendix C of Reclamation FPEA for the offstream storage rule, October 1999).

Reclamation notified FWS, by memorandum dated August 1, 2001, that the Proposed Action/Preferred Alternative is consistent with the previously evaluated scenarios, that no additional impacts on threatened and endangered species would occur, and that no further consultation was necessary. The estimated recovery period of ICUA has shifted into the future from that originally identified in the BA and consultation, and as a result, the future recovery of ICUA will be included as a covered action in the LCRMSCP.

Reclamation also consulted with the National Marine Fisheries Service, Southwest Region by letter dated June 22, 1998. Since the U.S. has no authority or discretion regarding the flow of water to the Colorado River delta, a section 7 consultation on the potential effects of its lower Colorado River operations and maintenance on the endangered Totoaba was not required. Likewise, because actions under the proposed Rule will not change the delivery of treaty water to Mexico, Reclamation determined that section 7 consultation on the Totoaba is not required on the proposed Rule. This consultation included the BA analyzing the effects from the most likely storage and retrieval scenarios.

Coachella Valley Water District

Implementation of the remainder of the CVWMP would involve the potential for disturbance of biological resources, including creosote scrub and desert wash vegetation, through construction of pipelines, reservoirs, and other facilities associated with the conservation of water within the CVWD service area. It is anticipated that these impacts, along with those from the elements of the CVWMP that are also considered part of the IA, would be mitigated on a site-by-site basis and would not be cumulatively significant.

Imperial Irrigation District

Lining the AAC and Coachella Canal has the potential for localized impacts to wetland habitat due to the reduction in seepage that would result. There is also a potential for wildlife to enter the canals and not be able to escape from the canals. Each of the respective environmental documents for these projects has provided measures to mitigate these site-specific impacts, and they would not contribute to a cumulative impact in the project area.

No other substantial impacts that could contribute to a cumulative impact have been identified within the IID service area.

Salton Sea

If implemented, the SSRP would be expected to result in a beneficial impact through the retention of the fish and wildlife values of the Sea. The feasibility and overall impact of this restoration is not known with certainty at this time pending additional studies and a revised Salton Sea Document.

Hydroelectric Power

Power is the last priority in regard to river operations as stated in project-specific legislation, and under the Law of the River (described in Chapter 1, section 1.2.2). Reclamation is the Federal agency authorized to generate hydroelectric power at Hoover, Davis, and Parker powerplants. BIA is the Federal agency authorized to generate hydroelectric power at Headgate Rock powerplant. Hydroelectric power production can be considered in terms of capacity and energy. As described in section 3.3, capacity of a hydroelectric plant is a function of the operational strategies of the upstream and downstream reservoirs, and energy is a function of the amount of water through the turbines or powerplant. Therefore, any long-term change to River operations, including reservoir levels, dam releases, or change in points of delivery of water may impact hydroelectric power production. The cumulative projects that may change River operations, including reservoir levels, dam releases, or change in points of delivery of Colorado River above and beyond the proposed project include the ISG, PVID Program, and the Rule for Offstream Storage (the change in delivery of Colorado River water due to AAC and Coachella Canal Lining Projects is considered part of the proposed action). Implementation of these projects could ultimately result in water transfers up to a cumulative total of 1.574 MAFY (the amount considered within the Biological Assessment for the Interim Surplus Criteria, USBR 2000a). Depending on the specific locations of the changed points of diversions may increase hydroelectric power and therefore have a beneficial impact at some facilities, or decrease hydroelectric power and therefore have a negative impact at other hydroelectric power facilities along the lower portion of the Colorado River.

Land Use

The proposed action would not cause any adverse change to land use, nor are adverse land use changes expected to result from any of the cumulative projects. The IID/SDCWA Water Conservation and Transfer Agreement could result in land fallowing, as could the IOP, but this would not be considered a substantial impact to land use.

Recreational Resources

The projects that were assessed as part of the cumulative analysis would not individually have substantive, adverse impacts on recreational resources within the project study area. As noted in section 4.2.1, however, cumulative impacts to Lake Mead and Lake Powell would be greater than for the proposed action alone. Lake Powell's elevation would fall below the 3,612-foot impact threshold for recreational facilities as much as 3 percent more often if all of the cumulative projects were implemented. Lake Mead could be as much as 20 feet lower in any given year, which could impact the use of docks, launch ramps, and other public use facilities.

These impacts are largely attributable to the ISG, and Reclamation has made a number of environmental commitments as part of the environmental review process for this action (USBR 2000b). These include initiating a bathymetric survey of Lake Mead in fiscal 2001 and coordinating with the Lake Mead National Recreation Area to identify critical facility elevations and navigational hazards that would be present under various reservoir surface elevations. Additionally, Reclamation will continue to monitor River operations, reservoir levels, and water supply and make this information available to the Colorado River Management Work Group, agencies, and public. This operational information will provide the Lake Mead National Recreation Area and the Glen Canyon National Recreation Area with probabilities for future reservoir elevations to aid in management of navigational aids, recreational facilities, other resources, and fiscal planning. Reclamation also is continuing to consult and coordinate with the Glen Canyon National Recreation Area and the Navajo Nation on the development of Antelope Point as a resort destination.

Agricultural Resources

As documented in section 3.5, Agricultural Resources, there have been substantial decreases in the amount of agricultural land that is in production in some portions of the project study area, with some counties experiencing low to moderate increases in total agricultural land in production. Most California counties experienced a decline, although the percentage of reduction has been relatively small. Mohave and Yuma Counties in Arizona and Clark County, Nevada have experienced moderate to high reductions in agricultural land. One exception to this trend has been La Paz County, Arizona, which has experienced a 22.9 percent increase in agricultural land during a recent 10-year period.

Two of the projects considered as part of the cumulative analysis have potential impacts involving agricultural lands within the project study area: the MSCP and the PVID Program. The MSCP would likely result in some amount of land being converted from agricultural use to habitat. In the case of the PVID Program, agricultural lands may be taken out of production for periods of time. Thus, the projects considered in the cumulative analysis would have a combined cumulative impact involving temporary or permanent loss of agricultural lands. The proposed action could also result in the conversion of a relatively small amount of agricultural land along the Colorado River to habitat, which would contribute to the cumulative impact described above. Although the proposed action would contribute to a cumulative impact on agricultural resources, each of these combined impacts involve a series of incremental conversions that would not be considered substantive when considered together.

Socioeconomics

None of the projects described above is expected to create substantial changes to socioeconomic conditions, with the possible exception of the PVID Program, whose impacts are to be determined, and the IID/SDCWA Water Conservation and Transfer Agreement, which could result in a reduction of employment opportunities depending on the conservation methods selected. If the reduction in IID water use associated with the water transfer agreement was accomplished solely through land fallowing (300 KAFY of water would be conserved for transfer through fallowing), Imperial County could experience a net loss of 1,400 jobs, mostly in the agricultural sectors. Implementation of the Salton Sea Conservation Strategy by IID would mostly likely employ additional fallowing in the IID service area, which would result in additional job loss in the agricultural sector. Employment opportunities would be created by construction projects and the SSRP also could result in an economic benefit to the local area. The proposed action would have negligible impacts to socioeconomic resources and would not contribute to a cumulative impact.

Environmental Justice

The projects that were included in the cumulative analysis for this EIS are not expected to add incremental adverse, disproportionate impacts to low-income and minority communities. As documented in section 3.8 (Environmental Justice), the proposed action would not create any direct adverse impacts related to environmental justice; but could have indirect impacts on Hispanic farm workers from fallowing, and on Hispanic populations from windblown dust from exposed Salton Sea sediments after the year 2030.

Cultural Resources

The projects included in the cumulative analysis have the potential to impact cultural resources where land surface disturbance is required. It is not possible to quantify these impacts because site-specific cultural resource surveys have not been conducted. However, because many of the projects involve actions on previously disturbed lands (such as farmlands), or relate to changes in Colorado River operations, which have been highly variable historically, impacts to cultural resources would tend to be reduced. Further, compliance with Section 106 of the National Historic Preservation Act will require specific evaluation of impacted cultural resources, and development of mitigation plans.

Tribal Resources

As described in section 3.10, Tribal Resources, the issues of concern to tribal entities in the project study area are ITAs, water quality, biological resources, land use, cultural resources, and hydroelectric power generation. The proposed action would not impact water rights and therefore it would not contribute to a cumulative impact involving water rights.

Significant cumulative impacts to ITAs are not anticipated. Neither the proposed action nor any of the cumulative projects would impact tribal water rights or have significant impacts on other ITAs.

The proposed action would contribute to cumulative water quality impacts involving increases in salinity along the Colorado River below Hoover and Parker Dams. However, it is assumed that the Colorado River Basin Salinity Control Program would ameliorate this impact and that salinity standards would continue to be met on the River. Drinking water quality of the Torres Martinez Band of Desert Cahuilla Indians would be adversely affected by increased TDS from CVWD's groundwater recharge of Colorado River water. The anticipated TDS increase would not impair any beneficial uses of the water, as defined by established state and federal primary (or health-based) drinking water standards. Thus, a negligible cumulative impact to water quality is expected to impact tribal lands.

The cumulative impacts to biological resources in the project study area are expected to be minimized by implementation of the MSCP, which would provide long-term beneficial impacts to fish and wildlife species along the lower portion of the Colorado River. Although some short-term impacts may occur from these projects, the ultimate result is expected to be beneficial. For this reason, tribal resources relating to biological resources would not be cumulatively impacted.

The proposed action would not contribute to any cumulative land use impacts in the project study area. Therefore, there would be no cumulative impacts related to land use on tribal lands.

Each of the projects considered in the cumulative analysis has the potential to contribute to a cumulative impact involving the damage or loss of known and unknown cultural resources. Many historic properties are damaged or destroyed by both natural processes and human activities. The activities described herein are subject to environmental regulatory review and the issuance of permits and approvals from regulatory agencies. These activities include provisions for assessing and protecting important cultural resources and consulting with tribal entities prior to implementing projects. These regulatory processes would limit the magnitude of any potential cumulative impact relating cultural resources, including those located on tribal lands.

The cumulative projects that may change River operations, including reservoir levels, dam releases, or change in points of delivery of Colorado River above and beyond the proposed project include the ISG, MSCP, PVID Program, and the Rule for Offstream Storage (the change in delivery of Colorado River water due to AAC and Coachella Canal Lining Projects is considered part of the proposed action). Implementation of these projects could ultimately result in water transfers up to a cumulative total of 1.574 MAFY (the amount considered under

MSCP) or more. Depending on the specific locations of the changed points of diversions, negative impacts to specific hydroelectric facilities, including Headgate Rock Dam, could occur.

Air Quality

The TMDL Program would not be expected to cause air quality impacts, since it neither involves new construction nor physical activities that would result in air pollutant emissions in the project area. Some projects are expected to have short-term, construction-related impacts. These include the MSCP, Colorado River Basin Salinity Control Program, AAC Lining Project, Coachella Canal Lining Project and CVWMP, and Brawley Wetland Project. Construction impacts are usually localized. The proposed action would contribute to a cumulative short-term impact only if construction of these projects occurred at the same time and in the same general location. These projects, however, cover a broad geographic area, and it is unlikely that projects in the same area would be under construction at the same time. Moreover, air quality impacts from the proposed action are anticipated to be minor or readily mitigated through standard construction practices. Therefore, its contribution to a cumulative impact would be minimal.

The only potential for long-term impacts from the proposed action would occur from fugitive dust emissions due to the lowering of the water elevations of Lake Mead, Lake Powell, and the Salton Sea. This would be exacerbated by other projects, such as ISG and the PVID Program. The water elevation of the Salton Sea would decline as a result of the proposed action. With the implementation of the Salton Sea Conservation Strategy by IID, the water surface elevation of the Salton Sea would decrease below future baseline conditions after the year 2035. This effect would increase exposed shoreline and would produce potentially significant amounts of PM_{10} emissions. Since the project region presently does not attain the PM_{10} ambient air quality standards, this would be a significant cumulative air quality impact. The SSRP could diminish the impact, depending on the restoration measures that are proposed.

Changes in the water level of the Colorado River are expected to be within historic levels both with the proposed action and the projects considered in the cumulative impact analysis. No adverse impacts from fugitive dust are anticipated.

Transboundary Impacts

Hydrology

For analysis purposes, the mean and maximum values of the range of estimated future overrun account balances under each modeled IOP scenario were used to evaluate the potential effect on Lake Mead flood control releases and excess flows to Mexico in the Cumulative Condition. The probability of excess flows to Mexico would be similar under the Combined Cumulative IA and IOP Analysis and the Baseline for Cumulative Analysis. In some years probability of excess flow would be greater and in some years lower, but probability of excess flow per the Baseline for Cumulative Analysis and Combined Cumulative IA and IOP scenarios (assuming an average IOP account balance of 66 KAF) never differs by more than 3.5 percent. If maximum IOP account balance was held (331 KAF), the probability of a flood release could be decreased by 1 to 4.7 percent.

The probability of occurrence of excess flow of 250 KAF and 1 MAF is similar for the Combined Cumulative IA and IOP scenarios and the Baseline for Cumulative Analysis. The probability that excess flows to Mexico will exceed 250 KAF differs by no more than 5.9 percent between the combined IA and IOP and Baseline for Cumulative Analysis. Likewise, the probability that excess flows will exceed 1 MAF differs by no more than 3.5 percent.

Overall the results of the comparison between the Combined Cumulative IA-IOP scenarios and the Baseline for Cumulative Analysis found that the magnitude of observed excess flows is essentially the same. For example in years 2006, 2016, 2026 and 2050, the magnitude of the observed excess flows of the Combined Cumulative IA-IOP scenarios and the Baseline for Cumulative Analysis are essentially the same, albeit with a slight change in the frequency. There is a positive effect seen in the lower excess flow range (excess flows less than 1.0 MAFY) related to the effect of the water transfers modeled as part of the IA conditions. A negative effect is seen in the higher range of the excess flows (excess flows greater than 1.0 MAFY) attributable to the IOP modeled criteria. The observed increases in magnitude between the Combined Cumulative IA-IOP scenarios and the Baseline for Cumulative Analysis ranged from approximately 2 KAF to approximately 148 KAF with the average being around 88 KAF. The observed decreases in magnitude ranged from approximately 1.3 KAF to approximately 742 KAF with the average being around 230 KAF.

Other projects, such as the offstream storage rule and the storage and retrieval of Colorado River water under interstate release agreements could have similar impacts to excess flows to Mexico. During development of the offstream storage rule, Reclamation addressed NEPA compliance from a programmatic approach because many of the details of specific interstate agreements could not be ascertained at that time. The FPEA analyzed the most likely scenario that AWBA would store 1.2 MAF of Colorado River water offstream in Arizona for the benefit of an entity in Nevada. The potential effects to Mexico of storing water under a storage and interstate release agreement are discussed in section 4.2.2. In a normal year, the delivery of Colorado River water to Mexico will be 1.5 MAF and there will be no surplus or flood control release water. The diversion of treaty water by Mexico is made at Morelos Dam and there are no scheduled flows below this diversion point under normal conditions. Surplus water is also diverted at Morelos Dam, and there are no scheduled flows below this point except when flood control releases occur. The waters of the Colorado, once delivered to Mexico pursuant to the United States-Mexico Water Treaty of 1944, are the exclusive property of the sovereign nation of Mexico. DOI has no control over how Colorado River water is used once it reaches the international border. Further, the United States-Mexico Water Treaty of 1944 contains no provisions requiring Mexico to provide water for environmental protection nor any requirements relating to Mexico's use of that water. Finally, the 1964 Supreme Court decree enjoined Reclamation from releasing water to Mexico in excess of the quantity identified in the United States-Mexico Water Treaty of 1944 except for flood control purposes. Flood control releases are those water releases made in accordance with theFebruary 8, 1984 Field Working Agreement between DOI, Reclamation, and USACE for Flood Control Operation of Hoover Dam and Lake Mead, Colorado River, Nevada-Arizona. Flood control releases reflect regional climatic conditions and are required when forecasted inflow exceeds available storage space in Lakes Mead and Powell and allowable space in other upper basin reservoirs. These releases are not guaranteed nor are they a dependable water supply below the international boundary. These releases are in excess of U.S. needs and represent water that has the potential to flow to the Gulf of California. Reclamation modeled the probability of flood control releases over the potential storage years under the Rule. For the storage years between 1999-2015, flood control releases to Mexico would range between 1.310-0.544 MAFY without the Rule and 1.310-0.541 MAFY with the Rule. The probability of flood control releases is reduced on average by 0.83 percent from 2002-2016 when AWBA would be storing up to 1.2 MAF of retrievable water for the benefit of SNWA. The offstream storage of this 1.2 MAF of water is projected to reduce the average amount of flood control releases to Mexico by 23 KAFY from 1999-2015 (USBR 1996). The U.S. has no authority or discretion regarding the flow or use of flood control releases once it reaches the international border, and this water may or may not reach the Gulf. The small reduction in flood control releases does not represent a significant impact on minority and low-income communities along the Mexican border or near the Gulf of California..

Biological Resources

As noted above, excess flows below Morelos Dam are generally similar under the Cumulative Analysis and Baseline for Cumulative analysis conditions. The exception to this is the 18-year period between 2002 and 2019 where the excess flows observed under the Cumulative Analysis would be slightly lower than those observed under the baseline for Cumulative Analysis conditions.

Potential minor reductions in the frequency of excess flows below Morelos Dam resulting from the IOP would be unlikely to substantively reduce the amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This is particularly true since Reclamation believes that groundwater recharge in these areas is more a result of percolation induced by agricultural irrigation, drainage water, and the more frequent, but lower-volume, excess flows that are attributable to unused water delivery orders (by users in the Lower Division States) that make it past Morelos Dam. Scouring flows are required to expose new seed beds to allow cottonwood and willow to regenerate. No significant change to these types of flows is anticipated. Therefore, no substantive impacts to vegetation are anticipated.

4.3 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

With implementation of the IA and QSA, IID and CVWD would implement conservation actions and construction activities, which would have short-term impacts on the environment. These impacts include such things as construction-related air pollutant emissions and noise and temporary disturbances to biological communities. The IA would ultimately result in a settlement of water rights issues that would increase the predictability of water use for water diverted from the Colorado River by the participating agencies in California. This predictability is expected to have a stabilizing effect on the use of water in the region by ensuring that all parties stay within their annual allocations, thus ensuring long-term productivity.

Adoption of the IOP would not result in short-term uses of the environment to any great degree, but would contribute to the overall predictability of water use through requiring paybacks for overuse of water.

Implementation of biological conservation measures would have short-term construction-related impacts, such as air pollutant emissions, noise, and temporary disturbances to biological communities. However, the long-term benefits of these measures would be substantial since habitat for federally listed species would be monitored for quality, improved, and/or increased, and species augmentation through fish stocking and breeding would occur. Improvement of habitat for federally listed species would also have long-term benefits for native species that are not federally listed.

4.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments are decisions impacting non-renewable resources such as soils, wetlands, and waterfowl habitat. Such decisions are considered irreversible because their implementation would impact a resource to the point that renewal can occur only over a long period of time or at great expense or because they would cause the resource to be destroyed or removed. The term irreversible describes the loss of future options and applies to the impacts of using nonrenewable resources or resources that are renewable only over a long period of time.

Implementation of the IA and QSA would result in the commitment of resources as part of the overall regional agreement for limiting California water use to the State's apportionment of 4.4 MAFY in a normal year. Although the delivery of Colorado River water in Arizona, California, and Nevada is for permanent service under the Law of the River and contracts with the U.S., the changed distribution of water during the 75-year duration of the QSA can be seen as an irreversible action during that 75-year period. The primary area within the region that would experience substantial and most likely irreversible change would be the Salton Sea ecosystem and the lands and resources adjacent to the sea. With implementation of the IA, the surface elevation could drop and the salinity would increase more rapidly than under baseline conditions; these environmental impacts would impact the Salton Sea and associated resources and would be considered irreversible. However, as noted in this EIS, a similar impact to the Salton Sea could occur under baseline conditions without implementation of the IA. Implementation of the Salton Sea Conservation Strategy by IID would maintain Sea elevations at or above baseline conditions until at least the year 2030. After that time, reduced inflow would cause the Sea to decline to about elevation -240 feet msl by the year 2077, compared to the baseline elevation of -235 feet msl. The IA would also cause a lowering of the Colorado River between Parker Dam and Imperial Dam. The lost opportunity to produce power at Parker and Headgate Rock Dams with the transferred water would be considered an irretrievable commitment. Implementation of biological conservation measures would result in the monitoring, improvement, and/or creation of habitat along the Colorado River. These activities would have a positive ecological effect along the River, although the new habitat areas would not necessarily be considered irreversible. The IOP would not cause an irreversible commitment of resources since the IOP is an administrative policy that establishes a procedure for Lower Basin water users to pay back water used beyond their legal entitlement.

An irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used. "Irretrievable" also refers to the permanent loss of a resource including production, harvest, or use of natural resources.

Certain aspects of the IA would result in the irretrievable commitment of resources. Construction associated with conservation measures and other activities within the IID and the CVWD service areas would consume fossil fuels, which are a finite source of energy that cannot be regenerated. The same commitment of resources would be associated with construction of habitat areas with adoption of biological conservation measures. Adoption of the IOP would not result in an irretrievable commitment of resources.

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6.0 GLOSSARY OF TERMS

70R Alternative	The 70R Alternative assumed a 70-percentile inflow into the system subtracting out consumptive uses and system loses and checking the results to see if all of the water could be stored or if flood control releases from Lake Mead would be required. If flood control releases from Lake Mead would be required, surplus water would be made available to the Lower Basin beyond 7.5 MAF. The notation 70R refers to the specific inflow where 70 percent of the historical natural runoff is less than this value (17.4 MAF) for the Colorado River basin at Lee Ferry.
acre-foot	Volume of water (43,560 cubic feet) that would cover one acre to a depth of one foot.
affected environment	Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as a result of a proposed human action.
allocation, allotment	Refers to a distribution of water through which means specific persons or legal entities are assigned individual rights to consume pro rata shares of a specific quantity of water under legal entitlements. For example, a specific quantity of Colorado River water is distributed for use within each Lower Division State through an apportionment. The water available for consumptive use in that state is further distributed among water users in that state through the allocation. An allocation does not establish an entitlement; the entitlement is normally established by a written contract with the United States.
Annual Operating Plan (AOP)	The AOP describes how Reclamation will manage River resources over the 12-month period, consistent with the Long Range Operating Criteria and the *Arizona v. California 1964 Supreme Court Decree*. The AOP is prepared annually by Reclamation in cooperation with the Basin States, appropriate Federal agencies, Indian tribes, State and local agencies and the general public, including governmental interests as required by Federal law. As part of the AOP process, the Secretary makes annual determinations regarding the availability of Colorado River water for deliveries to the Lower Division States as described below.
apportionment	Refers to the distribution of water available to each Lower Division state in normal, surplus, or shortage years, as set forth, respectively, in Articles II (B)(1), II (B)(2), and II (B)(3) or the Decree in *Arizona v. California*.

backwater	A relatively small, generally shallow area of a river with little or no current.
benthic	Bottom of rivers, lakes, or oceans; organisms that live on the bottom of water bodies.
biological opinion	Document stating the U.S. Fish and Wildlife Service and the National Marine Fisheries Service opinion as to whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.
candidate species	Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the Service.
Colorado River Basin	The drainage basin of the Colorado River in the United States.
Colorado River Basin Project Act of 1968	This Act authorized construction of a number of water development projects, including the Central Arizona Project and required the Secretary to develop the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (LROC).
consumptive use	The total water diversions from the Colorado River, less return flows to the river.
critical habitat	Specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via *Federal Register* notices.
cultural resource	Building, site, district, structure, or object significant in history, architecture, archeology, culture, or science.
depletion	Loss of water from a stream, river, or basin resulting from consumptive use.
endangered species	A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range.
entitlement	Refers to an authorization to beneficially consume Colorado River water pursuant to (1) a decreed right, (2) a contract with the United States through the Secretary of the Interior, or (3) a Secretarial reservation of water.

eutrophic	A body of water, often shallow, containing high concentrations of dissolved nutrients with periods of oxygen deficiency.
flow	Volume of water passing a given point per unit of time expressed in cfs. *peak flow* – Maximum instantaneous flow in a specified period of time. *return flow* – Portion of water previously diverted from a stream and subsequently returned to that stream or to another body of water.
full pool	Volume of water in a reservoir at maximum design elevation
gaging station	Specific location on a stream where systematic observations of hydrologic data are obtained through mechanical or electrical means.
headwater	The source and upper part of a stream.
hydrology	Science dealing with natural runoff and its effect on streamflow.
hydroelectric power	Electrical capacity produced by falling water.
Interim Surplus Guidelines (ISG)	The Secretary has developed specific ISG that will provide mainstream users of Colorado River water, particularly those in California that currently utilize surplus water, a greater degree of predictability with respect to the likely existence, or lack thereof, of a surplus determination in a given year for the interim period (from 2002 to 2016). The guidelines facilitate California's transition to use of a reduced supply of Colorado River water.
Law of the River	As applied to the Colorado River, a combination of federal and state statutes, interstate compacts, court decisions and decrees, federal contracts, an international treaty with Mexico, and formally determined operating criteria.
lead agency	The agency initiating and overseeing the preparation of an environmental impact statement.
Lee Ferry	A reference point marking division between the Upper and Lower Colorado River Basins. The point is located in the mainstream of the Colorado River 1 mile below the mouth of the Paria River in Arizona.

Lees Ferry	Location of Colorado River ferry crossings (1873 to 1928) and site of the USGS stream gage above the Paria River confluence.
load	Amount of electrical power or energy delivered or required at a given point.
Lower Basin	The part of the Colorado River watershed below Lee Ferry, Arizona; covers parts of Arizona, California, Nevada, New Mexico, and Utah.
Lower Division	A division of the Colorado River system that includes the states of Arizona, Nevada, and California.
Lower Division States	Arizona, California, and Nevada as defined by Article II of the Colorado River Compact of 1922.
Maximum Contaminant Level (MCL)	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the level below which there is no known or expected risk as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards per National Primary Drinking Water Regulations (NPDWRs or primary standards) and apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water.
Maximum Contaminant Level Goal (MCLG)	The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
megawatt (MW)	One million watts of electrical power (capacity).
megawatt hour (MWh)	One million watt-hours of electrical energy.
Minute 242	Minute 242, August 30, 1973 of the International Boundary and Water Commission United States and Mexico pursuant to the Mexican Water Treaty. Similar to an amendment.
Participating Agencies	California agencies that are affected by the implementation of the QSA, specifically, CVWD, IID, MWD and SDCWA
PM_{10}	Particulate matter less than 10 microns in mean diameter.
Present Perfected Rights	With respect to the Colorado River, a water right exercised by the actual diversion of a specific quantity of water, prior to June 25, 1929, the effective date of the Boulder Canyon Project Act.

Primary Drinking Water	Enforceable standards per the National Primary Standards Drinking Water Regulations, applicable to public water systems designed to protect public health by limiting the levels of contaminants in drinking water.
priority	A ranking with respect to diversion of water relative to other water users.
quantification period	75-year period that the Implementation Agreement and Quantification Settlement Agreement would be in effect.
reach	A specified segment of a stream, channel, or other water conveyance.
reserved water	In the case of Indian reservations, rights based on the doctrine of Indian reserved rights, and in the case of Federal establishments other than Indian reservations, a Federal reservation of water for use on property under Federal jurisdiction.
riparian	Of, on, or pertaining to the bank of a river, pond, or lake.
RiverWare	A commercial river system simulation computer program that was configured to simulate operation of the Colorado River for this EIS.
salinity	A term used to refer to the dissolved minerals in water, also referred to as total dissolved solids.
San Luis Rey Indian Water Rights Settlement Parties (or San Luis Rey Settlement Parties)	Those entities named in PL 100-675, which include La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, the City of Escondido, Escondido Mutual Water Company (which is no longer in existence) and Vista Irrigation District
Secondary Drinking Water Standards	Non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. The EPA recommends secondary standards to water systems but does not require systems to comply.
Secretary	Secretary of the Interior
sediment	Unconsolidated solid material that comes from weathering of rock and is carried by, suspended in, or deposited by water or wind.

total dissolved solids (TDS)	A measure of the inorganic or mineral content of water, commonly expressed in milligrams per liter.
tributary	River or stream flowing into a larger river or stream.
Upper Basin	The part of the Colorado River watershed above Lee Ferry, Arizona; that covers parts of Arizona, Colorado, New Mexico, Utah, and Wyoming.
Upper Division	A division of the Colorado River system that includes the states of Colorado, New Mexico, Utah, and Wyoming.
watershed	The drainage area upstream of a specified point on a stream.

7.0 ACRONYMS

AAC	All-American Canal
ACEC	Area of Critical Environmental Concern
AF	Acre-feet
AFY	Acre-feet per year
AOP	Annual Operating Plan
AQD	Air Quality Division of the Arizona Department of Environmental Quality
APE	Area of Potential Effect
ARB	Air Resources Board
ASC	Archaeological Consulting Services
ASM	Arizona State Museum
AWBA	Arizona Water Banking Authority
BA	Biological Assessment
BACT	Best Available Control Technology
BCPA	Boulder Canyon Project Act
BIA	United States Bureau of Indian Affairs
BLM	United States Bureau of Land Management
BMI	Basic Management, Inc.
BMP	Best Management Practice
BO	Biological Opinion
CAA	Federal Clean Air Act of 1969
CAAQS	California Ambient Air Quality Standards
CA DHS	California's Department of Health Services
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District

CDC	California Department of Conservation
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CITES	Convention on International Trade in Endangered Species
CFR	Code of Federal Regulations
cfs	Cubic feet per second
cm	centimeters
CO	Carbon monoxide
CRA	Colorado River Aqueduct
CRB	Colorado River Board of California
CRBPA	Colorado River Basin Project Act
CRC	Colorado River Commission of Nevada
CRIT	Colorado River Indian Tribes
CRSS	Colorado River Simulation System
CVAG	Coachella Valley Association of Governments
CVMSHCP	Coachella Valley Multiple Species Habitat Conservation Plan
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
CY	Calendar Year
dB	Decibel
DEA	Draft Environmental Assessment

DHS	California Department of Health Services
DOF	California Department of Finance
DOI	United States Department of the Interior
DWR	California Department of Water Resources
EA	Environmental Assessment
ECM	Environmental Compliance Memorandum
EES	Enhanced Evaporation System
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Federal Endangered Species Act
ESM	Environmental Statement Memorandum
F1	First Generation or Wild-Born
FEIS	Final Environmental Impact Statement
FPEA	Final Programmatic Environmental Assessment
FWS	United States Fish and Wildlife Service
GLO	Government Land Office
HCP	Habitat Conservation Plan
I-10	Interstate 10
IA	Implementation Agreement
ICAPCD	Imperial County Air Pollution Control District
ICUA	Intentionally Created Unused Apportionment
ID-1	Improvement District No. 1
IID	Imperial Irrigation District
IOP	Inadvertent Overrun Policy

ISG	Interim Surplus Guidelines
IUCN	International Union for Conservation of Nature and Natural Resources
ITA	Indian Trust Asset
KAF	Thousand acre-feet
KAFY	Thousand acre-feet per year
kWh	Kilowatt-hours
LCRAS	Lower Colorado River Accounting System
LMNRA	Lake Mead National Recreation Area
LROC	Long-Range Operation of Colorado River Reservoirs
LVWCAMP	Las Vegas Wash Comprehensive Adaptive Management Plan
LVWCC	Las Vegas Wash Coordination Committee
MAF	Million acre-feet
MAFY	Million acre-feet per year
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDAQMD	Mojave Desert Air Quality Management District
mg/L	milligrams per liter
MODE	Main Outlet Extension Drain
MOU	Memorandum of Understanding
MPN/100 ml	Membrane filter count per 100 milliliters
MSCP	Multi-Species Conservation Program
msl	Mean sea level
MW	Megawatts
MWD	The Metropolitan Water District of Southern California
MWh	Megawatt-hours

M&I	Municipal and Industrial
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIB	Northerly International Boundary
NOI	Notice of Intent
NOP	Notice of Preparation
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NWR	National Wildlife Refuge
O_3	Ozone
OHV	Off-highway Vehicle
O&M	Operation and Maintenance
P-DP	Parker-Davis Project
PEIR	Programmatic Environmental Impact Report
PHG	Public Health Goal
PM_{10}	Particulate matter less than 10 microns in diameter
ppb	Parts per billion
ppm	Parts per million
PPR	Present Perfected Right
PRBO	Point Reyes Bird Observatory
PUP	Priority Use Power
PVID	Palo Verde Irrigation District
PXAO	Phoenix Area Office

QSA	Quantification Settlement Agreement
RCPG	Regional Comprehensive Plan and Guide
ROD	Record of Decision
ROI	Region of Influence
RV	Recreational Vehicle
RWQCB	California Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCIP	San Carlos Irrigation Project
SCP	Colorado River Basin Salinity Control Program
SDCAPCD	San Diego County Air Pollution Control District
SDCWA	San Diego County Water Authority
SH	State Highway
SHPO	State Historic Preservation Officer
SIB	Southerly International Boundary
SIP	State Implementation Plan
SNWA	Southern Nevada Water Authority
SRA	State Recreation Area
SSA	Salton Sea Authority
SSRP	Salton Sea Restoration Project
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
U.S.	United States
U.S. 95	United States Highway 95
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USDA-SCS	United States Department of Agriculture - Soil Conservation Service
USGS	United States Geological Survey
VCAPCD	Ventura County Air Pollution Control District
VOC	Volatile organic compound
WACOG	Western Arizona Council of Governments
WAPA	Western Area Power Administration
WRC	Water Resources Chapter
YPRD	Yuma Project Reservation Division
$\mu g/m^3$	Micrograms per cubic meter

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9.0 INDEX

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 1 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
HYDROLOGY/WATER QUALITY/WATER SUPPLY		
Implementation Agreement		
Potential impacts to Colorado River flows from transfers authorized by the IA.	Projected Average Annual Flow (MAFY): Glen Canyon to Hoover Dam: 8.23 to 10 Hoover Dam to Parker Dam: 8.54 to 9.72 Parker Dam to Imperial Dam: *At Headgate Rock Dam:* 6.72 to 6.8 *Below Palo Verde Diversion Dam*: 6.02 to 6.16	Primary impacts are in the reach between Parker Dam and Imperial Dam. Below Parker Dam, due to transfers authorized by the IA, average annual flows would decrease by a little as 138 KAF to as much as 388 KAF. This could result in lowering of median annual surface water levels by up to 0.4 feet in this reach.
Potential impacts to reservoir levels from transfers authorized by the IA.	Lake Powell levels are expected to be lower than historic levels due to increased Upper Basin depletions. Median Lake Powell levels are expected to decline for a number of years and then stabilize. In the short term (years 2002-2010), Lake Mead levels would be greater than that needed to produce electricity. However, after year 2011, there would be a 44% probability that Lake Mead would fall below 1083 feet msl. Through 2017, modeling results show that Lake Mead levels would exceed that needed for operation of Southern Nevada Water Authority's (SNWA) original intake (1050 feet msl), after 2017, reservoir levels would decline and there would be a 40% probability that Lake Mead would be lower than 1050 feet mean sea level (msl). During years 2002 through 2049, modeling shows that Lake Mead levels would be greater than necessary to operate SNWA)'s second water intake (1000 feet msl). But after 2049 there would be a 6% probability that Lake Mead elevation would be below elevation 1000 feet msl.	Lake Powell and Lake Mead water surface elevations would decline under No Action and this trend would continue with implementation of the IA. The IA would not cause a significant change relative to No Action in the anticipated lake levels.
HYDROLOGY/WATER QUALITY/WATER SUPPLY		
Potential impacts to water quality from transfers authorized by the IA.	Under No Action and without further additional salinity controls, salinity concentrations below Hoover, Parker, and Imperial Dams would reach and then exceed the Water Quality Standards for	Under the IA, projected salinity is similar to that of No Action. Below Hoover Dam and Parker Dam, projected salinity under the IA is no more than 1 mg/L higher than would be expected under No

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 2 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	Salinity in the Colorado River Basin by the year 2006. Continued implementation of the Colorado River Basin Salinity Control Program would ensure that the standards are maintained. Long-term, average salinities would be maintained at or below the numeric criteria levels.	Action. At Imperial Dam, salinity is no more than 8 mg/L higher than would occur under No Action. However, these impacts would be fully offset by the continued implementation of the authorized Colorado River Basin Salinity Control Program There would be increased selenium and salt concentrations in the New River, Alamo River and IID drains resulting from IID conservation actions. These increased concentrations complicate the ability to meet proposed TMDL's for selenium in the Alamo River and IID drains and the TMDL for salt in the Salton Sea. There would be increased selenium in CVWD drainage water, increased salinity in the CVWD Upper Valley aquifer and near groundwater recharge areas, and the potential introduction of perchlorate into CVWD groundwater.
Potential impacts to groundwater from transfers authorized by the IA.	In the valleys below Parker, it is estimated that for every 1 unit in drop in river elevation, groundwater under irrigated fields will drop by half a unit. In a non-irrigated reach, groundwater elevation drop is assumed to be equal to the river drop.	The decline in median river stage could result in similar declines in median groundwater levels (as much as 0.4 feet) relative to the No-Action Alternative. Reduction in groundwater elevation would be greatest in non-irrigated areas and less severe in irrigated areas.
Implementation Agreement/Inadvertent Overrun Policy		
Potential impacts to Colorado River flood releases from inadvertent overruns and payback policy.	None.	In the evaluation of the comparison of the differences in the observed flood flows between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, in approximately 16 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 3 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		In the evaluation of the comparison of the differences in the observed flood flows between the No Action and the IA that considered a Lower Basin Overrun Account Balance of 331 KAFY modeled conditions, in approximately 11.7 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF. No Forgiveness Alternative: Same as the proposed project.
HYDROLOGY/WATER QUALITY/WATER SUPPLY		
Potential impacts to Colorado River flows from inadvertent overruns and payback policy.	Without passage of the IOP, the Secretary would be required to enforce the provisions of the Decree. The Secretary would continue with the existing policy of not delivering water in excess of a State's, water district's, or entity's entitlement. No impact on flow.	Proposed IOP: With implementation of the IOP, the average increase in annual flow during overruns in the Hoover to Parker River reach would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.8 percent and an increase over flows under No Action as great as 1.1 percent1. The average decrease in flow due to paybacks would be roughly 72 KAF, or 0.6 percent less than average annual historic flows and 0.8 percent less than under No Action. Assuming the largest anticipated overrun, annual flows from Hoover Dam to Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 206 KAF. However, this represents the largest overrun and payback scenario anticipated. With implementation of the IOP, the average increase in annual flow in the Parker to Imperial

1 Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Havasu National NWR.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 4 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		River reach would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.9 percent and an increase over flows under No Action as great as 1.3 percent2. The average decrease in flow would be roughly 63 KAF, or 0.7 percent less than average annual historic flows and 0.9 percent less than under No Action. Assuming the largest anticipated overrun, annual flows below Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 176 KAF. However, this represents the largest overrun and payback scenario anticipated.
	HYDROLOGY/WATER QUALITY/WATER SUPPLY	
Potential impacts to Colorado River flows from inadvertent overruns (continued).		The potential elevation change from combined IOP and IA impacts is anticipated to be within the historic fluctuation and the fluctuation that would be seen under No Action. No Forgiveness Alternative: Similar to proposed IOP, except would have more extended payback periods which would result in lower flow a greater percentage of the time.
Biological Conservation Measures		
The potential impacts to hydrology resulting from the biological conservation measures.	None.	Potentially minor reduction in river flows.
The potential impacts to water quality resulting from the biological conservation measures.	None.	Potential impacts to water quality during construction activities.
	BIOLOGICAL RESOURCES-VEGETATION	
Implementation Agreement		
Colorado River. Potential loss of vegetation	No change to vegetation would occur.	Drop in groundwater levels may impact riparian

2 Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Headgate Rock Dam.

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam.		and marsh vegetation with shallow roots, such as cottonwood and willow trees. Full mitigation of these impacts would be accomplished through implementation of the biological conservation measures.
Imperial Irrigation District. Potential loss of native vegetation from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	Construction activities have the potential to cause both temporary and permanent losses of native vegetation, depending on the exact location and extent of such activities. Conservation measures could result in a reduction of flow and changes in water quality within drain water, which may reduce emergent marsh and riparian vegetation.
BIOLOGICAL RESOURCES-VEGETATION		
Coachella Valley Water District. Potential loss of native vegetation from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the CVWMP, resulting in impacts to biological resources that are similar to the IA.	Construction activities have the potential to cause both temporary and permanent losses of native vegetation, depending on the exact location and extent of such activities. Increased groundwater levels would increase the levels of drain water, which is expected to maintain current riparian and marsh vegetation in the drains even if water conservation measures are implemented.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to vegetation would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to vegetation would occur.	None.
Salton Sea. Potential loss of marsh and riparian vegetation from decreased water levels of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	The potential for a more rapidly declining Sea level has the potential to result in the loss of marsh and riparian vegetation, especially in the southern portion of the Sea. The declining sea level could impact wetland and riparian vegetation along the drains, rivers and streams entering the Sea, as well as the confluence of the fresh waters with the Sea.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 6 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Inadvertent Overrun Policy		
Potential impact to riparian and aquatic vegetation from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to vegetation would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to impact riparian and aquatic vegetation. No Forgiveness Alternative: Similar to proposed IOP.
BIOLOGICAL RESOURCES-VEGETATION		
Biological Conservation Measures		
Potential impact to native and non-native vegetation from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to vegetation would occur.	Construction may disrupt native and non-native vegetation, but this disruption would be temporary and it is anticipated that additional, better quality vegetation would be established once restoration is completed (beneficial impact). It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed only on an incidental basis.
Potential impact to native and non-native vegetation from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to vegetation would occur.	Construction may disrupt native and non-native vegetation, but this disruption would be temporary and it is anticipated that additional, better quality vegetation would be established once restoration is completed (beneficial impact). It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed only on an incidental basis.
BIOLOGICAL RESOURCES-FISH AND WILDLIFE		
Implementation Agreement		
Colorado River. Potential impact to fish and wildlife from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam and associated loss of vegetation habitat.	No change to fish and wildlife would occur.	A negligible adverse impact to sport fisheries would occur from lower river flows between Parker and Imperial dams. Drop in groundwater may reduce wetland and riparian habitat along the Colorado River, which is used by amphibians, reptiles, riparian and marsh obligate birds, and mammals.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 7 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Full mitigation of these impacts would be accomplished through implementation of the biological conservation measures.
BIOLOGICAL RESOURCES-FISH AND WILDLIFE		
Imperial Irrigation District. Potential impact to fish and wildlife from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	Any loss of marsh and riparian habitat resulting from reduced flow in the drains could adversely impact bird and amphibian species using that habitat. Loss of native vegetation from construction activities, while not expected to be substantial, could impact common and typical wildlife species using those habitats.
Coachella Valley Water District. Potential impact to fish and wildlife from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the CVWMP, resulting in impacts to biological resources that are similar to the IA.	Construction of new facilities may impact wildlife habitat, but it is anticipated that these areas would be primarily in disturbed areas such as roadways or adjacent to existing facilities.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to fish and wildlife would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to fish and wildlife would occur.	None.
Salton Sea. Potential impact to fish and wildlife from decreased water levels and water quality of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	The acceleration of the increase in Sea salinity would result in an earlier decline of sport fisheries, non-game fish, and fish-eating bird populations.
Inadvertent Overrun Policy		
Potential impact to fish and wildlife from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to fish and wildlife would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to adversely impact fish and wildlife. No Forgiveness Alternative: Similar to proposed IOP.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 8 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
BIOLOGICAL RESOURCES-FISH AND WILDLIFE		
Biological Conservation Measures		
Potential impact to fish and wildlife from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to fish and wildlife would occur.	Construction may disrupt vegetation and create short-term impacts on fish and wildlife species during the period of restorations. Sedimentation during dredging may also impact aquatic organisms. Removal of vegetation during the nesting season may impact nesting bird species.
Potential impact to fish and wildlife from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to fish and wildlife would occur.	Construction may disrupt vegetation and create short-term impacts on fish and wildlife species during the period of restorations. Sedimentation during dredging may also impact aquatic organisms. Removal of vegetation during the nesting season may impact nesting bird species.
BIOLOGICAL RESOURCES-SENSITIVE SPECIES		
Implementation Agreement		
Colorado River. Potential impact to sensitive plants, fish, and/or wildlife from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam.	No change to sensitive species would occur.	Drop in groundwater may reduce wetland and riparian habitat along the Colorado River, which may impact sensitive species, such as razorback suckers, bonytail chub, Yuma clapper rail, California black rail, southwestern willow flycatcher, and yellow-billed cuckoo. Impacts and mitigations were addressed in the 2001 FWS Biological Opinion.
Imperial Irrigation District. Potential impact to sensitive plants, fish, and/or wildlife from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	A Habitat Conservation Plan (HCP) has been prepared for the IID Water Conservation and Transfer Project. The HCP addresses both plant and fish and wildlife species within the IID service area and the Salton Sea. Construction of conservation projects, potential reduced flow and changed water quality in the drains, possible impacts on Salton Sea, and the potential for fallowing as a conservation method are all addressed in the HCP.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 9 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
BIOLOGICAL RESOURCES-SENSITIVE SPECIES		
Coachella Valley Water District. Potential impact to sensitive plants, fish, and/or wildlife from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the Coachella Valley Water Management Plan (CVWMP), resulting in impacts to biological resources that are similar to the IA.	None expected. Construction activities within any native plant community areas that could contain sensitive species would be evaluated for such species prior to the work. Potential impacts from increased flow in the drains will be addressed in the Coachella Valley Multi-Species Habitat Conservation Plan (CVMSHCP).
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to sensitive species would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to sensitive species would occur.	None.
Salton Sea. Potential impact to sensitive plants, fish, and/or wildlife from decreased water levels and water quality of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	Potential impacts to some of the more notable species of concern include the desert pupfish, Yuma clapper rail, and brown and white pelicans. The desert pupfish could be impacted by the more rapid reduction in water surface elevation of the Sea and potential isolation of drain habitats. The Yuma clapper rail and California black rail could be impacted by the loss or decline in productivity of the marshes near the Salton Sea. Fish-eating birds, such as the California brown pelican and white pelican, would be impacted sooner, since the fish that are food sources for these species would decline sooner.
Inadvertent Overrun Policy		
Potential impact to sensitive plants, fish, and/or wildlife from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to sensitive species would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to adversely impact sensitive species. No Forgiveness Alternative: Similar to proposed IOP.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 10 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
BIOLOGICAL RESOURCES-SENSITIVE SPECIES		
Biological Conservation Measures		
Potential impact to sensitive plants, fish, and/or wildlife from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to sensitive species would occur.	Construction would disrupt vegetation and cause sedimentation, which may create short-term impacts on sensitive species, such as the razorback sucker, Yuma clapper rail, and southwestern willow flycatcher. These impacts would be temporary and would lead to enhanced habitat for sensitive fish and wildlife species (beneficial impact).
Potential impact to sensitive plants, fish, and/or wildlife from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to sensitive species would occur.	Construction would disrupt vegetation and cause sedimentation, which may create short-term impacts on sensitive species, such as the razorback sucker, Yuma clapper rail, and southwestern willow flycatcher. These impacts would be temporary and would lead to enhanced habitat for sensitive fish and wildlife species (beneficial impact).
HYDROELECTRIC POWER		
Implementation Agreement		
Colorado River. Potential impact to hydroelectric power.	None.	Regarding potential impacts to energy, Hoover and Davis Dams would not be measurably impacted. Power produced at Parker and Headgate Rock Dams would be reduced by about 5 percent. MWD could be economically impacted because the reduction in energy would mean less Federal power to pump Colorado River water through the Colorado River Aqueduct. Parker-Davis Project (P-DP) preference customers would potentially be impacted through the loss of or a percentage of loss of excess energy, potential increase in rates, and a reduction in future contract resources. A reduction in energy at Headgate Rock Dam could impact BIA's ability to meet new tribal energy demands.
Imperial Irrigation District. Potential impact to hydroelectric power.	None.	The energy production at the hydroelectric power facilities operated by IID could be impacted.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 11 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
HYDROELECTRIC POWER		
Coachella Valley Water District. Potential impact to hydroelectric power.	None.	None.
Metropolitan Water District. Potential impact to hydroelectric power.	None.	MWD could be economically impacted because the reduction in energy would mean less Federal power to pump Colorado River water through the Colorado River Aqueduct.
San Diego County Water Authority. Potential impact to hydroelectric power.	None.	None.
Salton Sea. Potential impact to hydroelectric power.	None.	None.
Inadvertent Overrun Policy		
Potential impact to hydroelectric power from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: The IOP would have positive impacts on power production during overrun years and negative impacts during payback years. Power production at Hoover, Davis, Parker, and Headgate Rock Dams would be impacted. No Forgiveness Alternative: Similar to the proposed IOP.
Biological Conservation Measures		
Potential impact to hydroelectric power from restoration or creation of habitat along the Colorado River between Parker Dam and Imperial Dam.	None.	None.
LAND USE		
Implementation Agreement		
Colorado River. Potential changes to land use patterns from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	If the IA were not implemented, no significant substantive land use changes in the project study area or conflicts with existing policies are expected to occur. The reliability of Colorado River water supplies would not be increased for CVWD, MWD,	None.

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. None of these actions would be likely to impact development patterns or land use trends.	
Imperial Irrigation District. Potential changes to land use patterns from construction and operation of water conservation measures.	See Colorado River.	The conservation measures would be implemented on agricultural land and would not change land use patterns. The proposed water conservation measures would not result in any substantive land use impacts.
Coachella Valley Water District. Potential changes to land use patterns from construction of new facilities.	See Colorado River.	Pipelines would be placed mainly in existing streets, pump stations would be in agricultural areas, and recharge basins would be in open space, where they would not interfere with surrounding land uses. No substantive alteration of land use in this area is expected.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
LAND USE		
Salton Sea. Potential decline in recreational use from decreased water levels and increased salinity of the Salton Sea.	None.	Recreational use of the area, including sport fishing, is likely to decline sooner, given the acceleration of impacts to fish that would result from the increased salinity. This potential decrease in recreational activities would eventually occur whether or not the water transfers were implemented since salinity levels of the Sea would increase independently of implementation of the IA and QSA. The lands of the Torres Martinez Reservation, some of which underlie the existing Sea, would be impacted, since their lands would be exposed sooner and to a greater extent than under No Action..

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 13 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Inadvertent Overrun Policy		
Potential changes to land use patterns from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: None. No Forgiveness Alternative: None.
Biological Conservation Measures		
Potential changes to land use patterns from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Habitat restoration could result in a change from agricultural use to backwaters.
Potential changes to land use patterns from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Habitat restoration could result in a change from agricultural use to cottonwood-willow habitat.
RECREATIONAL RESOURCES		
Implementation Agreement		
Colorado River. Potential changes to recreational facilities from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	The water level of the River would change slightly, but the change would be within the normal range of variability, and no recreational facilities would be impacted. No changes are anticipated that would impact any recreational activities that are dependent upon fish or wildlife.
Imperial Irrigation District. Potential changes to recreational resources from construction and operation of water conservation measures and from reduction in drainage water.	None.	The proposed conservation measures would be located in remote farm areas and would not impact recreational resources.
Coachella Valley Water District. Potential changes to swimming and fishing in the Coachella Valley Stormwater Channel from increases in water flow, potential impacts to golf courses from use of Colorado River water instead of groundwater, and potential changes to recreational resources from construction of	None.	Increase in flows to the Coachella Valley Stormwater Channel would have no substantial impact on swimming or fishing, but fish may be able to move further upstream than is currently possible. There would have no substantial impact on golf courses or other recreational resources.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 14 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
new facilities.		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	None.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	None.	None.
RECREATIONAL RESOURCES		
Salton Sea. Potential decline in recreational use from decreased water levels and increased salinity of the Salton Sea.	Decreased water levels and increased salinity of the Sea would impact recreational uses. The increase in salinity would result in a substantive impact to sport fishing opportunities. The reduction in the Sea elevation would also substantively impact boat launching and mooring facilities once it receded below –230 feet since they would no longer have direct access to the water. Bird watching and waterfowl hunting also would likely decline since fewer birds would be present. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area.	Decreased surface area of the Sea would reduce the area that could be used for water-based recreational activities such as fishing and boating. The increase in exposed playa would provide more area for land-based recreation, including camping and picnicking, but may necessitate relocating facilities and trails that are currently near the water. It may also be necessary to remove exposed footings and other features that are currently under water for safety and aesthetic considerations. Increased salinity of the Sea would also impact sport-fishing opportunities, hunting, and wildlife viewing. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area.
Inadvertent Overrun Policy		
Potential decline in recreational use from potential payback requirements.	None.	Proposed IOP: Recreational resources would not be substantively impacted. No Forgiveness Alternative: Similar to the proposed IOP.
Biological Conservation Measures		
Potential impact to recreational resources on or near the Colorado River from restoration or creation of 44 acres of backwaters along the	There would be no impact to recreational resources, but the benefits to passive recreational activities (such as bird watching) related to the creation of	Establishing additional habitat along the River would benefit passive recreational activities because it would add to the total acreage of wildlife and fish

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Colorado River between Parker Dam and Imperial Dam.	new habitat along the Colorado River would not be realized.	habitat along the Colorado River mainstem (beneficial impact).
Potential impact to recreational resources on or near the Colorado River from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	There would be no impact to recreational resources, but the benefits to passive recreational activities (such as bird watching) related to the creation of new habitat along the Colorado River would not be realized.	Establishing additional habitat along the River would benefit passive recreational activities because it would add to the total acreage of wildlife and fish habitat along the Colorado River mainstem (beneficial impact).
	AGRICULTURAL RESOURCES	
Implementation Agreement		
Colorado River. Potential changes to agricultural land from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	Water use would have to be consistent with existing legal entitlements, although the manner in which this would occur is uncertain. The reliability of Colorado River water supplies would not be increased for CVWD, MWD, and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. This could impact the amount of water available for agricultural uses.	Any changes in River elevation would be minor and within current fluctuations and would not impact agricultural land.
Imperial Irrigation District. Potential reduction in agricultural production and/or decrease in the amount of land farmed from construction and operation of water conservation measures.	See Colorado River.	If fallowing were used as a conservation measure, it could be either rotational fallowing or permanent fallowing or a combination of the two. Rotational fallowing would be consistent with planned land uses and would not result in the reclassification of any prime or statewide important farmlands; therefore, no impact to agricultural resources would occur. However, permanent fallowing of agricultural land could be used to conserve water for transfer; therefore, the worst case impact of the proposed action would be the permanent fallowing of up to about 50,000 acres of land. This represents up to about 11 percent of the total net acreage in agricultural production within the IID water service area. Assuming all acreage included in the water conservation program was permanently fallowed, and thus reclassified, this would represent an

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 16 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		adverse, unavoidable impact to the agriculture resources of the IID water service area.
Coachella Valley Water District. Potential changes to agricultural resources from more reliance on Colorado River and SWP water and from construction of new facilities.	See Colorado River.	Colorado River water has good infiltration characteristics, which would benefit some agricultural uses (beneficial impact). Construction of new facilities would not convert farmland to non-agricultural use.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
Salton Sea. Potential changes to agricultural resources from decreased water levels and increased salinity of the Salton Sea.	The Salton Sea itself does not contain agricultural resources and therefore no impact would occur.	The Salton Sea itself does not contain agricultural resources and therefore no impact would occur.
AGRICULTURAL RESOURCES		
Inadvertent Overrun Policy		
Potential decline in crop selection for water users that must meet potential payback requirements.	This could impact short-term productivity on agriculture, but would not have long-term impacts and would not result in the loss of agricultural land or conflict with Williamson Act contracts.	Proposed IOP: Water users that are required to pay back water due to an inadvertent overrun may experience a short-term impact on agricultural productivity during payback years. No Forgiveness Alternative: Similar to proposed IOP.
Biological Conservation Measures		
Potential conversion of agricultural land to habit from the restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Creating backwaters could potentially occur on Prime or Unique Farmland or Farmland of Statewide Importance, but the acreage proposed for habitat restoration is relatively small (44 acres) and would not result in significant reduction in agricultural production within California or Arizona.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 17 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Potential conversion of agricultural land to habitat from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Creating cottonwood-willow habitat could potentially occur on Prime or Unique Farmland or Farmland of Statewide Importance, but the acreage proposed for habitat restoration is relatively small (up to 1,116 acres) and would not result in significant reduction in agricultural production within California or Arizona.
	SOCIOECONOMICS	
Implementation Agreement		
Colorado River. Potential for change to population, housing or socioeconomics from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	The reliability of Colorado River water supplies for CVWD, MWD, and SDCWA would not increase, and there is a potential for the need for extreme water conservation or water rationing programs during drought years. These actions would not result in changes to population, employment, or housing trends; however, it is likely that the cost of water would increase due at least in part to the legal challenges and litigation that are expected if other water transfers are attempted. The precise economic impacts will depend on future decisions and legal actions; impacts are likely to be negative, but they cannot be determined at this time.	None.
Imperial Irrigation District. Potential for decrease in employment or adverse impacts to population and housing from construction and operation of water conservation measures.	See Colorado River.	Construction of the water conservation measures is not anticipated to result in a substantive reduction in agricultural production or the amount of land farmed, and therefore would not adversely impact employment. Construction and operation of new facilities would be located in agricultural areas, and this minor amount of construction would not impact population or housing. If the reduction in water use in the IID service area was accomplished solely through land fallowing, Imperial County could experience a net loss of 1,400 jobs, mostly in the agricultural sectors. Such a change would comprise just under 3 percent of the Year 2000 county employment level. Net agricultural sector job losses

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		would total 1,300, representing about 12 percent of the total county agricultural employment. The net decrease in the value of business output is estimated to be $98 million. This represents approximately 2 percent of the estimated $4.8 billion total value of business output for Imperial County.
Coachella Valley Water District. Potential for adverse impacts to population trends and employment from an increased water supply to the CVWD service area and from construction and operation of new facilities.	See Colorado River.	The increased water supply to the CVWD service area would be used to offset the existing groundwater overdraft and would not change population trends or impact agriculture. Construction and operation of new facilities would be located in agricultural areas or along existing roadways, and this minor amount of construction would not impact population or housing.
SOCIOECONOMICS		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
Salton Sea. Potential for adverse impacts to population trends and employment from decreased water levels and water quality of the Salton Sea.	Decreased water levels and increased salinity of the Sea would have negative impacts to the area's biological and recreational resources, which could adversely impact the local economy.	Decrease in water levels and decline in water quality would impact the fisheries and other recreational resources of the Sea, which may indirectly impact employment opportunities in the area. It could possibly lead to a reduction in population, depending on the severity of the impact. This potential loss of employment opportunities, while having social consequences, would not constitute a substantive change to the environment.
Inadvertent Overrun Policy		
Potential for change to population, housing or socioeconomics from potential payback requirements.	This alternative would not impact housing or population. Reclamation would enforce its obligations under the Decree, which may include	Proposed IOP: This policy would impact agricultural uses in the IID service area. Payback measures could include fallowing in the IID service

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	reduced deliveries for those diverters that are projected to overrun based on their diversion rate and projected diversions for the remainder of the year, and/or stop deliveries for diverters that are at their entitlement amount. This could result in a short-term reduction in agricultural productivity, with associated economic impacts, in the IID service area, the extent of which is dependent upon the amount of water involved.	area, which could have a short-term impact on agricultural productivity, employment, and revenue during payback years. Given the comparatively small amount of water to be paid back, the overall impact would be minor. CVWD would likely reduce its recharge efforts during payback years, which would not impact the service area's economy. No aspects of the IOP would impact population or housing. No Forgiveness Alternative: Similar to proposed IOP.
	SOCIOECONOMICS	
Biological Conservation Measures		
Potential for change to population, housing or socioeconomics from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Constructing or restoring backwaters would create a small, short-term increase in employment opportunities. This measure potentially could result in the loss of 44 acres of agricultural land, depending on the site(s) selected. This could result in the loss of some agricultural employment opportunities.
Potential for change to population, housing or socioeconomics from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Constructing or restoring habitat would create a small, short-term increase in employment opportunities. This measure potentially could result in the loss of up to 1,116 acres of agricultural land, depending on the site(s) selected. This could result in the loss of some agricultural employment opportunities.
	ENVIRONMENTAL JUSTICE	
Implementation Agreement		
Colorado River. Potential for a disproportionate impact on any low-income and minority populations from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	A slight lowering of the surface water elevation along the Colorado River between Parker and Imperial Dams would have an impact on biological resources. These changes would occur throughout this reach of the River, impacting each community in an approximately equal fashion, and would not

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 20 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		have a disproportionate impact on any low-income and minority populations.
Imperial Irrigation District. Potential for a disproportionate impact on any low-income and minority populations from construction and operation of water conservation measures.	None.	Fallowing would result in job losses in the farm production and services sector, which would disproportionately impact Hispanic and low-income people.
Coachella Valley Water District. Potential for a disproportionate impact on any low-income and minority populations from construction and operation of new facilities.	None.	None.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	None.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	None.	None.
Salton Sea. Potential for a disproportionate impact on any low-income and minority populations from decreased water levels and water quality of the Salton Sea.	None.	Windblown dust from exposed Salton Sea sediments would disproportionately affect Hispanic populations within one mile of the Salton Sea and also throughout the Salton Sea Air Basin.
	ENVIRONMENTAL JUSTICE	
Inadvertent Overrun Policy		
Potential for a disproportionate impact on any low-income and minority populations from potential payback requirements.	None.	Proposed IOP: Under the currently proposed policy, entities with Colorado River water diversion entitlements would not be eligible to take advantage of the IOP. The proposed policy does not, however, encroach upon those with diversion entitlements. Those with diversion entitlements could seek to enter into a consumptive use contract with Reclamation should they desire to utilize the IOP. No Forgiveness Alternative: Impacts would be as described for the proposed action.

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Biological Conservation Measures		
Potential for a disproportionate impact on any low-income and minority populations from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	The locations of restoration sites have not yet been determined; however, the site locations would be determined based on hydrological and biological feasibility and the availability of the land. Because of the increased biological, aesthetic, and recreational values associated with habitat restoration, the primary impact of restoration activities would be beneficial. There would be no disproportionate impact on low-income and minority populations.
ENVIRONMENTAL JUSTICE		
Potential for a disproportionate impact on any low-income and minority populations from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	The locations of restoration sites have not yet been determined; however, the site locations would be determined based on hydrological and biological feasibility and the availability of the land. Because of the increased biological, aesthetic, and recreational values associated with habitat restoration, the primary impact of restoration activities would be beneficial. There would be no disproportionate impact on low-income and minority populations.
CULTURAL RESOURCES		
Implementation Agreement		
Impacts on historic properties between Parker and Imperial Dams within the River channel and in backwaters, lakes, and marshy areas having a direct connection to the River.	None.	The IA would not impact cultural resources.
Inadvertent Overrun Policy		
Impacts on historic properties along the lower portion of the River; the precise area of potential impacts is to be determined at a later date.	None.	Proposed IOP: Impacts of the IOP are considered part of ongoing River operations. No Forgiveness Alternative: Impacts would be described as for the proposed action.

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Biological Conservation Measures		
Impacts on historic properties within the historic floodplain of the River between Parker and Imperial Dams.	None.	Impacts of the biological conservation measures are to be determined at a later date, when site-specific information is available.
TRIBAL RESOURCES		
Implementation Agreement		
Colorado River. The IA could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	Tribal Resources along the lower Colorado River would not be impacted. The structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, could lose $200 million in State funding and may not be implemented; therefore, there may not be water available from canal lining projects to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act.	The IA would facilitate the San Luis Rey Indian Water Rights Settlement, resulting in a beneficial impact to the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians. Increased salinity levels at Imperial Dam would impact tribal lands located along the Colorado River between Parker Dam and Imperial Dam, but this increase falls within the normal range of fluctuations that occur along the reach. In addition, this impact would be fully mitigated by implementation of authorized salinity control projects. Impacts to biological resources would be avoided through implementation of the proposed biological conservation measures. Regarding hydroelectric power, a reduction in Headgate energy could impact BIA's ability to meet new Tribal energy demands. Reclamation has concluded that the reduction in power produced at Headgate as a result of the water transfers is not an Indian Trust Asset, and Reclamation does not propose to mitigate or compensate for this reduced opportunity to produce power.
Coachella Valley Water District. Potential for adverse impacts to tribal resource from groundwater recharge.	No additional Colorado River water would be provided to CVWD, and overdrafted groundwater conditions would continue.	Groundwater recharge with Colorado River water is anticipated to have an adverse impact on the quality of groundwater extracted near the recharge basins in the Lower Coachella Valley because Colorado River water typically has higher concentrations of TDS and other chemical constituents than the local groundwater currently does. Recharge with

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 23 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Colorado River water could introduce low levels of perchlorate into the groundwater near the recharge basins. Groundwater recharge would affect the groundwater supply of the Torres Martinez Band of Desert Cahuilla Indians. CVWD would work with the Tribe to bring the drinking water supply of the Tribe into compliance by either providing domestic water service or by providing appropriate well-head treatment should recharge of Colorado River water cause any Torres Martinez drinking water well to exceed any recognized health based water quality standard.
Salton Sea. Potential for adverse impacts to tribal resources from decreased water levels and water quality of the Salton Sea.	Decreased water levels and increased salinity of the Sea would have negative impacts to the area's biological and recreational resources, and would expose currently inundated lands of the Torres Martinez Reservation.	Lowered water surface elevation of the Salton Sea would result in the exposure of Torres Martinez Band of Desert Cahuilla Indians' tribal land that is currently inundated by the Salton Sea. These exposed lands contain natural and cultural resources that are considered by the Tribe to be ITAs. Exposure could result in adverse impacts on cultural resources from vandalism and erosion. Flowage easements held over these lands by CVWD and IID would severely limit most economic development opportunities. The Tribe is quite concerned with any impact to the fishery resource or recreational economy. The Tribe also has expressed concern about increases in wind-blown dust from the exposure of lands previously inundated by the Salton Sea
TRIBAL RESOURCES		
Inadvertent Overrun Policy		
The IOP could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	None.	Proposed IOP: Impacts to cultural resources are to be evaluated separately from this EIS. Regarding hydroelectric power, the IOP would have positive impacts on power production during overrun years and negative impacts during payback years. Power production at Hoover, Davis, Parker, and Headgate

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 24 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Rock Dams would be impacted. No Forgiveness Alternative: Impacts would be as described for the proposed action.
Biological Conservation Measures		
The Biological Conservation Measures could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	None.	There could be a short-term impact to water quality associated with construction of habitat restoration sites. Potential short-term impact to biological and cultural resources could occur depending on the locations selected to implement the conservation measures. Regarding hydroelectric power, implementation of the biological conservation measures would have no impact on power generation.
	AIR QUALITY	
Implementation Agreement		
<u>Colorado River</u>. Potential for increase in windblown fugitive dust emissions from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	The amount of land exposed by decreased water levels is relatively small and some may become revegetated. Potential for increase in windblown fugitive dust emissions from these periodically dry lands would be minimal.
	AIR QUALITY	
<u>Imperial Irrigation District</u>. Potential air quality impacts from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA and QSA were not implemented. This could result in air quality impacts that are similar to those described in the proposed action.	The impact of emissions from construction of on-farm water conservation measures and water treatment/reuse systems would not exceed any ambient air quality standard. Fugitive dust emissions from soil disturbances are considered to be within the realm of typical farm operations. Conservation measures also could include fallowing, which could result in a decrease in combustive emissions. Fallowed lands would no longer be subject to plowing and other agricultural activities that would create windblown dust, but the exposed area of the fallowed lands could in itself create some windblown dust.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 25 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Coachella Valley Water District. Potential air quality impacts from construction and operation of new facilities.	There is the likelihood that some of the facilities considered in the proposed action may still be constructed in the CVWD service area to accommodate other elements of the CVWMP not directly related to the IA and QSA. This could result in air quality impacts that are similar to those described in the proposed action. CVWD might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the State Water Project (SWP) or groundwater, or further development of new supplies through recycling or desalination. Some of these actions might require construction, which would have air quality impacts.	The impact of emissions from construction of new facilities would cause temporary impacts to local air quality and could exceed air emission thresholds established by the South Coast Air Quality Management District (SCAQMD) within the South Coast Air Basin (SCAB) project region. Mitigation measures for this impact will be identified in the Programmatic Environmental Impact Report (PEIR) being prepared by CVWD for the CVWMP or in project-level documents prepared for the construction of specific program components. Operation of facilities associated with implementation of the IA and QSA within the CVWD service area would have minimal impacts on air quality.
AIR QUALITY		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	The reliability of Colorado River water supplies would not be increased for MWD under this alternative, and this agency might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. Some of these actions might require construction, which would have air quality impacts.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	The reliability of Colorado River water supplies would not be increased for SDCWA under this alternative, and this agency might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. Some of these actions	

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	might require construction, which would have air quality impacts.	
AIR QUALITY		
Salton Sea. Potential increase in dust emissions from decreased water levels of the Salton Sea and potential increase in odorous emissions from decreased water quality of the Sea.	The Salton Sea is expected to decline from its current elevation under the No-Action Alternative (i.e., no water transfers). The soils along the Salton Sea shoreline have a moderate potential for wind-blown dust. Dust emissions from these areas would in part be due to the level of human disturbances, such as vehicle activities, or from subsequent wind erosion. The reduction of water flow into the Salton Sea could increase odorous emissions in proximity to this body of water.	IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change to a substantial reduction. Under most scenarios, the Salton Sea would shrink at a faster rate than under No Action. IID determined that the project would produce significant amounts of windblown dust from the exposed shoreline of the Salton Sea. IID proposes to implement a program to mitigate dust emissions that could occur from the exposed shorelines. IID indicates that a level of uncertainty would remain regarding whether or not the mitigation program would reduce short-term and long-term impacts from dust emissions that could occur from the exposed Salton Sea shorelines. This impact, therefore, remains potentially significant and unavoidable. Given the complexity of the interrelationship of phosphate inputs, water quantity, and water quality, it is not possible to quantify the effect the proposed action would have on odorous emissions in the Salton Sea. However, compared to the existing conditions and projected continuation of eutrophication conditions at the Salton Sea, the effects of the proposed action on odors is expected to be minimal.
Inadvertent Overrun Policy		
Potential air quality impacts from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: Implementation of the IOP would produce minimal air quality impacts to this region. If the IOP resulted in the need to fallow fields in the IID service area in order to conserve water to

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		payback an overrun, this impact would generally produce a beneficial impact to air quality, as the elimination of cultivation from these areas would reduce the amount of fugitive dust generated from these areas; unless the fallowed soils were treated with a soil stabilizer, however, they would generate some windblown dust. No Forgiveness Alternative: Impacts would be as described for the proposed action.
Biological Conservation Measures		
Potential increase in combustive emissions due to the use of fossil fuel-fired construction equipment and increase in fugitive dust emissions due to ground-disturbing activities from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	It is expected that the impact of emissions from construction activities would not exceed any ambient air quality standard. Implementation of fugitive dust control measures would effectively minimize PM10 emissions from these activities.
Potential increase in combustive emissions due to the use of fossil fuel-fired construction equipment and increase in fugitive dust emissions due to ground-disturbing activities from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	It is expected that the impact of emissions from construction activities would not exceed any ambient air quality standard. Implementation of fugitive dust control measures would effectively minimize PM10 emissions from these activities.
TRANSBOUNDARY IMPACTS		
Implementation Agreement		
Potential changes to the probability and magnitude of excess flows to Mexico.	Hydrology. From years 2002 to 2026, the probability of excess flows varies from 20 to 25 percent. After 2030, the probability of flood flows decreases to 10 to 15 percent. The magnitude of flood flows varies from 0 to over 6 MAF, with large flood flows (over 250 KAF) anticipated approximately 20 percent of the time and flood flows over 1 MAF less than 15 percent of time.	Hydrology. The probability and magnitude of excess flows to Mexico is similar but occasionally higher under the IA.

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 28 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
TRANSBOUNDARY IMPACTS		
Potential impacts to habitat and species in Mexico.	Biological Resources**.** It is anticipated that flood flow frequency and quantities would be reduced under the No-Action Alternative. This may result in some reduction of wildlife habitat through the reduction in flows reaching the Delta area. It is expected, however, that much of the existing habitat would remain as it is since most of the riparian habitat is composed of salt cedar, which would be fed by groundwater. No measurable impact is expected to sensitive marine species.	Biological Resources**.** The IA would result in a flood flow probability and magnitude that are generally equal to, or somewhat greater than, the No-Action Alternative. Therefore, this action would have no potential impact on any federally listed species in Mexico.
Inadvertent Overrun Policy		
Potential changes to the probability and magnitude of excess flows to Mexico.	See *Hydrology* above.	Hydrology. Proposed IOP: The inadvertent overrun and payback policy does not apply to Mexico. However, actions undertaken by IOP users could affect excess flows to Mexico. The overall impact of the IOP would be to decrease both the probability of a flood release and the magnitude of a flood release. Combined, the IA and IOP reduce probability of a flood release by 1.2 to 3.5 percent in some of the years modeled. In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, in approximately 16 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF. In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered a Lower Basin Overrun Account

Table ES-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 29 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Balance of 331 KAFY modeled conditions, in approximately 11.7 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF. No Forgiveness Alternative: Impacts would be as described for the proposed action.
TRANSBOUNDARY IMPACTS		
Potential impacts to habitat and species in Mexico.	See *Biological Resources* above.	Biological Resources**.** No substantive impacts to vegetation are anticipated. It is anticipated that impacts to fish and wildlife species within the Delta area and within the Sea of Cortez would be negligible or nonexistent. Habitat is expected to remain much as it is today, and there would be no appreciable change in habitat quality for fish and wildlife. The IOP would have no impact on special status species.
Biological Conservation Measures		
No biological conservation measures would be implemented downstream of Imperial Dam; thus, they would not impact water resources in Mexico.	None.	None.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 1 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
HYDROLOGY/WATER QUALITY/WATER SUPPLY		
Implementation Agreement		
Potential impacts to Colorado River flows from transfers authorized by the IA.	Projected Average Annual Flow (MAFY): Glen Canyon to Hoover Dam: 8.23 to 10 Hoover Dam to Parker Dam: 8.54 to 9.72 Parker Dam to Imperial Dam: *At Headgate Rock Dam:* 6.72 to 6.8 *Below Palo Verde Diversion Dam*: 6.02 to 6.16	Primary impacts are in the reach between Parker Dam and Imperial Dam. Below Parker Dam, due to transfers authorized by the IA, average annual flows would decrease by a little as 138 KAF to as much as 388 KAF. This could result in lowering of median annual surface water levels by up to 0.4 feet in this reach.
Potential impacts to reservoir levels from transfers authorized by the IA.	Lake Powell levels are expected to be lower than historic levels due to increased Upper Basin depletions. Median Lake Powell levels are expected to decline for a number of years and then stabilize. In the short term (years 2002-2010), Lake Mead levels would be greater than that needed to produce electricity. However, after year 2011, there would be a 44% probability that Lake Mead would fall below 1083 feet msl. Through 2017, modeling results show that Lake Mead levels would exceed that needed for operation of Southern Nevada Water Authority's (SNWA) original intake (1050 feet msl), after 2017, reservoir levels would decline and there would be a 40% probability that Lake Mead would be lower than 1050 feet mean sea level (msl). During years 2002 through 2049, modeling shows that Lake Mead levels would be greater than necessary to operate SNWA)'s second water intake (1000 feet msl). But after 2049 there would be a 6% probability that Lake Mead elevation would be below elevation 1000 feet msl.	Lake Powell and Lake Mead water surface elevations would decline under No Action and this trend would continue with implementation of the IA. The IA would not cause a significant change relative to No Action in the anticipated lake levels.
HYDROLOGY/WATER QUALITY/WATER SUPPLY		
Potential impacts to water quality from transfers authorized by the IA.	Under No Action and without further additional salinity controls, salinity concentrations below Hoover, Parker, and Imperial Dams would reach and then exceed the Water Quality Standards for	Under the IA, projected salinity is similar to that of No Action. Below Hoover Dam and Parker Dam, projected salinity under the IA is no more than 1 mg/L higher than would be expected under No

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	Salinity in the Colorado River Basin by the year 2006. Continued implementation of the Colorado River Basin Salinity Control Program would ensure that the standards are maintained. Long-term, average salinities would be maintained at or below the numeric criteria levels.	Action. At Imperial Dam, salinity is no more than 8 mg/L higher than would occur under No Action. However, these impacts would be fully offset by the continued implementation of the authorized Colorado River Basin Salinity Control Program There would be increased selenium and salt concentrations in the New River, Alamo River and IID drains resulting from IID conservation actions. These increased concentrations complicate the ability to meet proposed TMDL's for selenium in the Alamo River and IID drains and the TMDL for salt in the Salton Sea. There would be increased selenium in CVWD drainage water, increased salinity in the CVWD Upper Valley aquifer and near groundwater recharge areas, and the potential introduction of perchlorate into CVWD groundwater.
<u>Potential impacts to groundwater</u> from transfers authorized by the IA.	In the valleys below Parker, it is estimated that for every 1 unit in drop in river elevation, groundwater under irrigated fields will drop by half a unit. In a non-irrigated reach, groundwater elevation drop is assumed to be equal to the river drop.	The decline in median river stage could result in similar declines in median groundwater levels (as much as 0.4 feet) relative to the No-Action Alternative. Reduction in groundwater elevation would be greatest in non-irrigated areas and less severe in irrigated areas.
Implementation Agreement/Inadvertent Overrun Policy		
<u>Potential impacts to Colorado River flood releases</u> from inadvertent overruns and payback policy.	None.	In the evaluation of the comparison of the differences in the observed flood flows between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, in approximately 16 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 3 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		In the evaluation of the comparison of the differences in the observed flood flows between the No Action and the IA that considered a Lower Basin Overrun Account Balance of 331 KAFY modeled conditions, in approximately 11.7 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF. No Forgiveness Alternative: Same as the proposed project.
	HYDROLOGY/WATER QUALITY/WATER SUPPLY	
Potential impacts to Colorado River flows from inadvertent overruns and payback policy.	Without passage of the IOP, the Secretary would be required to enforce the provisions of the Decree. The Secretary would continue with the existing policy of not delivering water in excess of a State's, water district's, or entity's entitlement. No impact on flow.	Proposed IOP: With implementation of the IOP, the average increase in annual flow during overruns in the Hoover to Parker River reach would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.8 percent and an increase over flows under No Action as great as 1.1 percent[1]. The average decrease in flow due to paybacks would be roughly 72 KAF, or 0.6 percent less than average annual historic flows and 0.8 percent less than under No Action. Assuming the largest anticipated overrun, annual flows from Hoover Dam to Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 206 KAF. However, this represents the largest overrun and payback scenario anticipated. With implementation of the IOP, the average increase in annual flow in the Parker to Imperial

1 Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Havasu National NWR.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 4 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		River reach would be approximately 90 KAF. An increase of 90 KAF to annual flow represents an increase from historic average annual flows of 0.9 percent and an increase over flows under No Action as great as 1.3 percent2. The average decrease in flow would be roughly 63 KAF, or 0.7 percent less than average annual historic flows and 0.9 percent less than under No Action. Assuming the largest anticipated overrun, annual flows below Parker Dam could be augmented by overruns by as much as 313 KAF and diminished by payback as great as 176 KAF. However, this represents the largest overrun and payback scenario anticipated.
	HYDROLOGY/WATER QUALITY/WATER SUPPLY	
Potential impacts to Colorado River flows from inadvertent overruns (continued).		The potential elevation change from combined IOP and IA impacts is anticipated to be within the historic fluctuation and the fluctuation that would be seen under No Action. No Forgiveness Alternative: Similar to proposed IOP, except would have more extended payback periods which would result in lower flow a greater percentage of the time.
Biological Conservation Measures		
The potential impacts to hydrology resulting from the biological conservation measures.	None.	Potentially minor reduction in river flows.
The potential impacts to water quality resulting from the biological conservation measures.	None.	Potential impacts to water quality during construction activities.
	BIOLOGICAL RESOURCES-VEGETATION	
Implementation Agreement		
Colorado River. Potential loss of vegetation	No change to vegetation would occur.	Drop in groundwater levels may impact riparian

2 Increased and decreased flows resulting from implementation of the IOP were compared to estimated flows under No Action at Headgate Rock Dam.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 5 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam.		and marsh vegetation with shallow roots, such as cottonwood and willow trees. Full mitigation of these impacts would be accomplished through implementation of the biological conservation measures.
Imperial Irrigation District. Potential loss of native vegetation from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	Construction activities have the potential to cause both temporary and permanent losses of native vegetation, depending on the exact location and extent of such activities. Conservation measures could result in a reduction of flow and changes in water quality within drain water, which may reduce emergent marsh and riparian vegetation.
BIOLOGICAL RESOURCES-VEGETATION		
Coachella Valley Water District. Potential loss of native vegetation from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the CVWMP, resulting in impacts to biological resources that are similar to the IA.	Construction activities have the potential to cause both temporary and permanent losses of native vegetation, depending on the exact location and extent of such activities. Increased groundwater levels would increase the levels of drain water, which is expected to maintain current riparian and marsh vegetation in the drains even if water conservation measures are implemented.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to vegetation would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to vegetation would occur.	None.
Salton Sea. Potential loss of marsh and riparian vegetation from decreased water levels of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	The potential for a more rapidly declining Sea level has the potential to result in the loss of marsh and riparian vegetation, especially in the southern portion of the Sea. The declining sea level could impact wetland and riparian vegetation along the drains, rivers and streams entering the Sea, as well as the confluence of the fresh waters with the Sea.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 6 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Inadvertent Overrun Policy		
Potential impact to riparian and aquatic vegetation from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to vegetation would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to impact riparian and aquatic vegetation. No Forgiveness Alternative: Similar to proposed IOP.
BIOLOGICAL RESOURCES-VEGETATION		
Biological Conservation Measures		
Potential impact to native and non-native vegetation from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to vegetation would occur.	Construction may disrupt native and non-native vegetation, but this disruption would be temporary and it is anticipated that additional, better quality vegetation would be established once restoration is completed (beneficial impact). It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed only on an incidental basis.
Potential impact to native and non-native vegetation from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to vegetation would occur.	Construction may disrupt native and non-native vegetation, but this disruption would be temporary and it is anticipated that additional, better quality vegetation would be established once restoration is completed (beneficial impact). It is likely that areas where vegetation is removed would contain primarily introduced species, and native vegetation would be removed only on an incidental basis.
BIOLOGICAL RESOURCES-FISH AND WILDLIFE		
Implementation Agreement		
Colorado River. Potential impact to fish and wildlife from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam and associated loss of vegetation habitat.	No change to fish and wildlife would occur.	A negligible adverse impact to sport fisheries would occur from lower river flows between Parker and Imperial dams. Drop in groundwater may reduce wetland and riparian habitat along the Colorado River, which is used by amphibians, reptiles, riparian and marsh obligate birds, and mammals.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 7 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Full mitigation of these impacts would be accomplished through implementation of the biological conservation measures.
BIOLOGICAL RESOURCES-FISH AND WILDLIFE		
Imperial Irrigation District. Potential impact to fish and wildlife from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	Any loss of marsh and riparian habitat resulting from reduced flow in the drains could adversely impact bird and amphibian species using that habitat. Loss of native vegetation from construction activities, while not expected to be substantial, could impact common and typical wildlife species using those habitats.
Coachella Valley Water District. Potential impact to fish and wildlife from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the CVWMP, resulting in impacts to biological resources that are similar to the IA.	Construction of new facilities may impact wildlife habitat, but it is anticipated that these areas would be primarily in disturbed areas such as roadways or adjacent to existing facilities.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to fish and wildlife would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to fish and wildlife would occur.	None.
Salton Sea. Potential impact to fish and wildlife from decreased water levels and water quality of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	The acceleration of the increase in Sea salinity would result in an earlier decline of sport fisheries, non-game fish, and fish-eating bird populations.
Inadvertent Overrun Policy		
Potential impact to fish and wildlife from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to fish and wildlife would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to adversely impact fish and wildlife. No Forgiveness Alternative: Similar to proposed IOP.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 8 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	BIOLOGICAL RESOURCES-FISH AND WILDLIFE	
Biological Conservation Measures		
Potential impact to fish and wildlife from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to fish and wildlife would occur.	Construction may disrupt vegetation and create short-term impacts on fish and wildlife species during the period of restorations. Sedimentation during dredging may also impact aquatic organisms. Removal of vegetation during the nesting season may impact nesting bird species.
Potential impact to fish and wildlife from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to fish and wildlife would occur.	Construction may disrupt vegetation and create short-term impacts on fish and wildlife species during the period of restorations. Sedimentation during dredging may also impact aquatic organisms. Removal of vegetation during the nesting season may impact nesting bird species.
	BIOLOGICAL RESOURCES-SENSITIVE SPECIES	
Implementation Agreement		
<u>Colorado River</u>. Potential impact to sensitive plants, fish, and/or wildlife from decreased water levels (and associated drop in groundwater level) of the Colorado River between Parker Dam and Imperial Dam.	No change to sensitive species would occur.	Drop in groundwater may reduce wetland and riparian habitat along the Colorado River, which may impact sensitive species, such as razorback suckers, bonytail chub, Yuma clapper rail, California black rail, southwestern willow flycatcher, and yellow-billed cuckoo. Impacts and mitigations were addressed in the 2001 FWS Biological Opinion.
<u>Imperial Irrigation District</u>. Potential impact to sensitive plants, fish, and/or wildlife from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA were not implemented. This could result in impacts comparable to the proposed IA.	A Habitat Conservation Plan (HCP) has been prepared for the IID Water Conservation and Transfer Project. The HCP addresses both plant and fish and wildlife species within the IID service area and the Salton Sea. Construction of conservation projects, potential reduced flow and changed water quality in the drains, possible impacts on Salton Sea, and the potential for fallowing as a conservation method are all addressed in the HCP.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 9 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
BIOLOGICAL RESOURCES-SENSITIVE SPECIES		
Coachella Valley Water District. Potential impact to sensitive plants, fish, and/or wildlife from construction and operation of new facilities and from increased groundwater levels.	Some facilities considered under the IA may still be constructed as part of the Coachella Valley Water Management Plan (CVWMP), resulting in impacts to biological resources that are similar to the IA.	None expected. Construction activities within any native plant community areas that could contain sensitive species would be evaluated for such species prior to the work. Potential impacts from increased flow in the drains will be addressed in the Coachella Valley Multi-Species Habitat Conservation Plan (CVMSHCP).
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	No change to sensitive species would occur.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	No change to sensitive species would occur.	None.
Salton Sea. Potential impact to sensitive plants, fish, and/or wildlife from decreased water levels and water quality of the Salton Sea.	The impacts identified for the IA would occur, but at a slower rate.	Potential impacts to some of the more notable species of concern include the desert pupfish, Yuma clapper rail, and brown and white pelicans. The desert pupfish could be impacted by the more rapid reduction in water surface elevation of the Sea and potential isolation of drain habitats. The Yuma clapper rail and California black rail could be impacted by the loss or decline in productivity of the marshes near the Salton Sea. Fish-eating birds, such as the California brown pelican and white pelican, would be impacted sooner, since the fish that are food sources for these species would decline sooner.
Inadvertent Overrun Policy		
Potential impact to sensitive plants, fish, and/or wildlife from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	No change to sensitive species would occur.	Proposed IOP: Any yearly changes within the River flow would be within the historical hydrological parameters of the River and are not expected to adversely impact sensitive species. No Forgiveness Alternative: Similar to proposed IOP.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 10 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
BIOLOGICAL RESOURCES-SENSITIVE SPECIES		
Biological Conservation Measures		
Potential impact to sensitive plants, fish, and/or wildlife from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	No change to sensitive species would occur.	Construction would disrupt vegetation and cause sedimentation, which may create short-term impacts on sensitive species, such as the razorback sucker, Yuma clapper rail, and southwestern willow flycatcher. These impacts would be temporary and would lead to enhanced habitat for sensitive fish and wildlife species (beneficial impact).
Potential impact to sensitive plants, fish, and/or wildlife from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	No change to sensitive species would occur.	Construction would disrupt vegetation and cause sedimentation, which may create short-term impacts on sensitive species, such as the razorback sucker, Yuma clapper rail, and southwestern willow flycatcher. These impacts would be temporary and would lead to enhanced habitat for sensitive fish and wildlife species (beneficial impact).
HYDROELECTRIC POWER		
Implementation Agreement		
Colorado River. Potential impact to hydroelectric power.	None.	Regarding potential impacts to energy, Hoover and Davis Dams would not be measurably impacted. Power produced at Parker and Headgate Rock Dams would be reduced by about 5 percent. MWD could be economically impacted because the reduction in energy would mean less Federal power to pump Colorado River water through the Colorado River Aqueduct. Parker-Davis Project (P-DP) preference customers would potentially be impacted through the loss of or a percentage of loss of excess energy, potential increase in rates, and a reduction in future contract resources. A reduction in energy at Headgate Rock Dam could impact BIA's ability to meet new tribal energy demands.
Imperial Irrigation District. Potential impact to hydroelectric power.	None.	The energy production at the hydroelectric power facilities operated by IID could be impacted.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 11 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	HYDROELECTRIC POWER	
Coachella Valley Water District. Potential impact to hydroelectric power.	None.	None.
Metropolitan Water District. Potential impact to hydroelectric power.	None.	MWD could be economically impacted because the reduction in energy would mean less Federal power to pump Colorado River water through the Colorado River Aqueduct.
San Diego County Water Authority. Potential impact to hydroelectric power.	None.	None.
Salton Sea. Potential impact to hydroelectric power.	None.	None.
Inadvertent Overrun Policy		
Potential impact to hydroelectric power from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: The IOP would have positive impacts on power production during overrun years and negative impacts during payback years. Power production at Hoover, Davis, Parker, and Headgate Rock Dams would be impacted. No Forgiveness Alternative: Similar to the proposed IOP.
Biological Conservation Measures		
Potential impact to hydroelectric power from restoration or creation of habitat along the Colorado River between Parker Dam and Imperial Dam.	None.	None.
	LAND USE	
Implementation Agreement		
Colorado River. Potential changes to land use patterns from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	If the IA were not implemented, no significant substantive land use changes in the project study area or conflicts with existing policies are expected to occur. The reliability of Colorado River water supplies would not be increased for CVWD, MWD,	None.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 12 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. None of these actions would be likely to impact development patterns or land use trends.	
Imperial Irrigation District. Potential changes to land use patterns from construction and operation of water conservation measures.	See Colorado River.	The conservation measures would be implemented on agricultural land and would not change land use patterns. The proposed water conservation measures would not result in any substantive land use impacts.
Coachella Valley Water District. Potential changes to land use patterns from construction of new facilities.	See Colorado River.	Pipelines would be placed mainly in existing streets, pump stations would be in agricultural areas, and recharge basins would be in open space, where they would not interfere with surrounding land uses. No substantive alteration of land use in this area is expected.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
LAND USE		
Salton Sea. Potential decline in recreational use from decreased water levels and increased salinity of the Salton Sea.	None.	Recreational use of the area, including sport fishing, is likely to decline sooner, given the acceleration of impacts to fish that would result from the increased salinity. This potential decrease in recreational activities would eventually occur whether or not the water transfers were implemented since salinity levels of the Sea would increase independently of implementation of the IA and QSA. The lands of the Torres Martinez Reservation, some of which underlie the existing Sea, would be impacted, since their lands would be exposed sooner and to a greater extent than under No Action..

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 13 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Inadvertent Overrun Policy		
Potential changes to land use patterns from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: None. No Forgiveness Alternative: None.
Biological Conservation Measures		
Potential changes to land use patterns from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Habitat restoration could result in a change from agricultural use to backwaters.
Potential changes to land use patterns from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Habitat restoration could result in a change from agricultural use to cottonwood-willow habitat.
	RECREATIONAL RESOURCES	
Implementation Agreement		
<u>Colorado River</u>. Potential changes to recreational facilities from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	The water level of the River would change slightly, but the change would be within the normal range of variability, and no recreational facilities would be impacted. No changes are anticipated that would impact any recreational activities that are dependent upon fish or wildlife.
<u>Imperial Irrigation District</u>. Potential changes to recreational resources from construction and operation of water conservation measures and from reduction in drainage water.	None.	The proposed conservation measures would be located in remote farm areas and would not impact recreational resources.
<u>Coachella Valley Water District</u>. Potential changes to swimming and fishing in the Coachella Valley Stormwater Channel from increases in water flow, potential impacts to golf courses from use of Colorado River water instead of groundwater, and potential changes to recreational resources from construction of	None.	Increase in flows to the Coachella Valley Stormwater Channel would have no substantial impact on swimming or fishing, but fish may be able to move further upstream than is currently possible. There would have no substantial impact on golf courses or other recreational resources.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 14 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
new facilities.		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	None.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	None.	None.
RECREATIONAL RESOURCES		
Salton Sea. Potential decline in recreational use from decreased water levels and increased salinity of the Salton Sea.	Decreased water levels and increased salinity of the Sea would impact recreational uses. The increase in salinity would result in a substantive impact to sport fishing opportunities. The reduction in the Sea elevation would also substantively impact boat launching and mooring facilities once it receded below –230 feet since they would no longer have direct access to the water. Bird watching and waterfowl hunting also would likely decline since fewer birds would be present. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area.	Decreased surface area of the Sea would reduce the area that could be used for water-based recreational activities such as fishing and boating. The increase in exposed playa would provide more area for land-based recreation, including camping and picnicking, but may necessitate relocating facilities and trails that are currently near the water. It may also be necessary to remove exposed footings and other features that are currently under water for safety and aesthetic considerations. Increased salinity of the Sea would also impact sport-fishing opportunities, hunting, and wildlife viewing. Land-based recreational activities, such as camping, would likely decline due to the aesthetic degradation of the area.
Inadvertent Overrun Policy		
Potential decline in recreational use from potential payback requirements.	None.	Proposed IOP: Recreational resources would not be substantively impacted. No Forgiveness Alternative: Similar to the proposed IOP.
Biological Conservation Measures		
Potential impact to recreational resources on or near the Colorado River from restoration or creation of 44 acres of backwaters along the	There would be no impact to recreational resources, but the benefits to passive recreational activities (such as bird watching) related to the creation of	Establishing additional habitat along the River would benefit passive recreational activities because it would add to the total acreage of wildlife and fish

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 15 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Colorado River between Parker Dam and Imperial Dam.	new habitat along the Colorado River would not be realized.	habitat along the Colorado River mainstem (beneficial impact).
Potential impact to recreational resources on or near the Colorado River from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	There would be no impact to recreational resources, but the benefits to passive recreational activities (such as bird watching) related to the creation of new habitat along the Colorado River would not be realized.	Establishing additional habitat along the River would benefit passive recreational activities because it would add to the total acreage of wildlife and fish habitat along the Colorado River mainstem (beneficial impact).
AGRICULTURAL RESOURCES		
Implementation Agreement		
Colorado River. Potential changes to agricultural land from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	Water use would have to be consistent with existing legal entitlements, although the manner in which this would occur is uncertain. The reliability of Colorado River water supplies would not be increased for CVWD, MWD, and SDCWA under this alternative, but these agencies might undertake other actions to increase their overall water supply reliability. This could impact the amount of water available for agricultural uses.	Any changes in River elevation would be minor and within current fluctuations and would not impact agricultural land.
Imperial Irrigation District. Potential reduction in agricultural production and/or decrease in the amount of land farmed from construction and operation of water conservation measures.	See Colorado River.	If fallowing were used as a conservation measure, it could be either rotational fallowing or permanent fallowing or a combination of the two. Rotational fallowing would be consistent with planned land uses and would not result in the reclassification of any prime or statewide important farmlands; therefore, no impact to agricultural resources would occur. However, permanent fallowing of agricultural land could be used to conserve water for transfer; therefore, the worst case impact of the proposed action would be the permanent fallowing of up to about 50,000 acres of land. This represents up to about 11 percent of the total net acreage in agricultural production within the IID water service area. Assuming all acreage included in the water conservation program was permanently fallowed, and thus reclassified, this would represent an

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 16 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		adverse, unavoidable impact to the agriculture resources of the IID water service area.
Coachella Valley Water District. Potential changes to agricultural resources from more reliance on Colorado River and SWP water and from construction of new facilities.	See Colorado River.	Colorado River water has good infiltration characteristics, which would benefit some agricultural uses (beneficial impact). Construction of new facilities would not convert farmland to non-agricultural use.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
Salton Sea. Potential changes to agricultural resources from decreased water levels and increased salinity of the Salton Sea.	The Salton Sea itself does not contain agricultural resources and therefore no impact would occur.	The Salton Sea itself does not contain agricultural resources and therefore no impact would occur.
	AGRICULTURAL RESOURCES	
Inadvertent Overrun Policy		
Potential decline in crop selection for water users that must meet potential payback requirements.	This could impact short-term productivity on agriculture, but would not have long-term impacts and would not result in the loss of agricultural land or conflict with Williamson Act contracts.	Proposed IOP: Water users that are required to pay back water due to an inadvertent overrun may experience a short-term impact on agricultural productivity during payback years. No Forgiveness Alternative: Similar to proposed IOP.
Biological Conservation Measures		
Potential conversion of agricultural land to habit from the restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Creating backwaters could potentially occur on Prime or Unique Farmland or Farmland of Statewide Importance, but the acreage proposed for habitat restoration is relatively small (44 acres) and would not result in significant reduction in agricultural production within California or Arizona.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 17 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Potential conversion of agricultural land to habitat from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Creating cottonwood-willow habitat could potentially occur on Prime or Unique Farmland or Farmland of Statewide Importance, but the acreage proposed for habitat restoration is relatively small (up to 1,116 acres) and would not result in significant reduction in agricultural production within California or Arizona.
SOCIOECONOMICS		
Implementation Agreement		
Colorado River. Potential for change to population, housing or socioeconomics from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	The reliability of Colorado River water supplies for CVWD, MWD, and SDCWA would not increase, and there is a potential for the need for extreme water conservation or water rationing programs during drought years. These actions would not result in changes to population, employment, or housing trends; however, it is likely that the cost of water would increase due at least in part to the legal challenges and litigation that are expected if other water transfers are attempted. The precise economic impacts will depend on future decisions and legal actions; impacts are likely to be negative, but they cannot be determined at this time.	None.
Imperial Irrigation District. Potential for decrease in employment or adverse impacts to population and housing from construction and operation of water conservation measures.	See Colorado River.	Construction of the water conservation measures is not anticipated to result in a substantive reduction in agricultural production or the amount of land farmed, and therefore would not adversely impact employment. Construction and operation of new facilities would be located in agricultural areas, and this minor amount of construction would not impact population or housing. If the reduction in water use in the IID service area was accomplished solely through land fallowing, Imperial County could experience a net loss of 1,400 jobs, mostly in the agricultural sectors. Such a change would comprise just under 3 percent of the Year 2000 county employment level. Net agricultural sector job losses

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 18 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		would total 1,300, representing about 12 percent of the total county agricultural employment. The net decrease in the value of business output is estimated to be $98 million. This represents approximately 2 percent of the estimated $4.8 billion total value of business output for Imperial County.
Coachella Valley Water District. Potential for adverse impacts to population trends and employment from an increased water supply to the CVWD service area and from construction and operation of new facilities.	See Colorado River.	The increased water supply to the CVWD service area would be used to offset the existing groundwater overdraft and would not change population trends or impact agriculture. Construction and operation of new facilities would be located in agricultural areas or along existing roadways, and this minor amount of construction would not impact population or housing.
SOCIOECONOMICS		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	See Colorado River.	None.
Salton Sea. Potential for adverse impacts to population trends and employment from decreased water levels and water quality of the Salton Sea.	Decreased water levels and increased salinity of the Sea would have negative impacts to the area's biological and recreational resources, which could adversely impact the local economy.	Decrease in water levels and decline in water quality would impact the fisheries and other recreational resources of the Sea, which may indirectly impact employment opportunities in the area. It could possibly lead to a reduction in population, depending on the severity of the impact. This potential loss of employment opportunities, while having social consequences, would not constitute a substantive change to the environment.
Inadvertent Overrun Policy		
Potential for change to population, housing or socioeconomics from potential payback requirements.	This alternative would not impact housing or population. Reclamation would enforce its obligations under the Decree, which may include	Proposed IOP: This policy would impact agricultural uses in the IID service area. Payback measures could include fallowing in the IID service

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 19 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	reduced deliveries for those diverters that are projected to overrun based on their diversion rate and projected diversions for the remainder of the year, and/or stop deliveries for diverters that are at their entitlement amount. This could result in a short-term reduction in agricultural productivity, with associated economic impacts, in the IID service area, the extent of which is dependent upon the amount of water involved.	area, which could have a short-term impact on agricultural productivity, employment, and revenue during payback years. Given the comparatively small amount of water to be paid back, the overall impact would be minor. CVWD would likely reduce its recharge efforts during payback years, which would not impact the service area's economy. No aspects of the IOP would impact population or housing. No Forgiveness Alternative: Similar to proposed IOP.
SOCIOECONOMICS		
Biological Conservation Measures		
Potential for change to population, housing or socioeconomics from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	Constructing or restoring backwaters would create a small, short-term increase in employment opportunities. This measure potentially could result in the loss of 44 acres of agricultural land, depending on the site(s) selected. This could result in the loss of some agricultural employment opportunities.
Potential for change to population, housing or socioeconomics from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	Constructing or restoring habitat would create a small, short-term increase in employment opportunities. This measure potentially could result in the loss of up to 1,116 acres of agricultural land, depending on the site(s) selected. This could result in the loss of some agricultural employment opportunities.
ENVIRONMENTAL JUSTICE		
Implementation Agreement		
Colorado River. Potential for a disproportionate impact on any low-income and minority populations from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	A slight lowering of the surface water elevation along the Colorado River between Parker and Imperial Dams would have an impact on biological resources. These changes would occur throughout this reach of the River, impacting each community in an approximately equal fashion, and would not

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 20 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		have a disproportionate impact on any low-income and minority populations.
Imperial Irrigation District. Potential for a disproportionate impact on any low-income and minority populations from construction and operation of water conservation measures.	None.	Fallowing would result in job losses in the farm production and services sector, which would disproportionately impact Hispanic and low-income people.
Coachella Valley Water District. Potential for a disproportionate impact on any low-income and minority populations from construction and operation of new facilities.	None.	None.
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	None.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	None.	None.
Salton Sea. Potential for a disproportionate impact on any low-income and minority populations from decreased water levels and water quality of the Salton Sea.	None.	Windblown dust from exposed Salton Sea sediments would disproportionately affect Hispanic populations within one mile of the Salton Sea and also throughout the Salton Sea Air Basin.
	ENVIRONMENTAL JUSTICE	
Inadvertent Overrun Policy		
Potential for a disproportionate impact on any low-income and minority populations from potential payback requirements.	None.	Proposed IOP: Under the currently proposed policy, entities with Colorado River water diversion entitlements would not be eligible to take advantage of the IOP. The proposed policy does not, however, encroach upon those with diversion entitlements. Those with diversion entitlements could seek to enter into a consumptive use contract with Reclamation should they desire to utilize the IOP. No Forgiveness Alternative: Impacts would be as described for the proposed action.
Biological Conservation Measures		

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Potential for a disproportionate impact on any low-income and minority populations from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	The locations of restoration sites have not yet been determined; however, the site locations would be determined based on hydrological and biological feasibility and the availability of the land. Because of the increased biological, aesthetic, and recreational values associated with habitat restoration, the primary impact of restoration activities would be beneficial. There would be no disproportionate impact on low-income and minority populations.
ENVIRONMENTAL JUSTICE		
Potential for a disproportionate impact on any low-income and minority populations from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	The locations of restoration sites have not yet been determined; however, the site locations would be determined based on hydrological and biological feasibility and the availability of the land. Because of the increased biological, aesthetic, and recreational values associated with habitat restoration, the primary impact of restoration activities would be beneficial. There would be no disproportionate impact on low-income and minority populations.
CULTURAL RESOURCES		
Implementation Agreement		
Impacts on historic properties between Parker and Imperial Dams within the River channel and in backwaters, lakes, and marshy areas having a direct connection to the River.	None.	The IA would not impact cultural resources.
Inadvertent Overrun Policy		
Impacts on historic properties along the lower portion of the River; the precise area of potential impacts is to be determined at a later date.	None.	Proposed IOP: Impacts of the IOP are considered part of ongoing River operations. No Forgiveness Alternative: Impacts would be described as for the proposed action.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 22 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Biological Conservation Measures		
Impacts on historic properties within the historic floodplain of the River between Parker and Imperial Dams.	None.	Impacts of the biological conservation measures are to be determined at a later date, when site-specific information is available.
TRIBAL RESOURCES		
Implementation Agreement		
Colorado River. The IA could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	Tribal Resources along the lower Colorado River would not be impacted. The structural projects embodied in the QSA that would help conserve Colorado River water, such as lining the AAC and the Coachella Canal, could lose $200 million in State funding and may not be implemented; therefore, there may not be water available from canal lining projects to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act.	The IA would facilitate the San Luis Rey Indian Water Rights Settlement, resulting in a beneficial impact to the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians. Increased salinity levels at Imperial Dam would impact tribal lands located along the Colorado River between Parker Dam and Imperial Dam, but this increase falls within the normal range of fluctuations that occur along the reach. In addition, this impact would be fully mitigated by implementation of authorized salinity control projects. Impacts to biological resources would be avoided through implementation of the proposed biological conservation measures. Regarding hydroelectric power, a reduction in Headgate energy could impact BIA's ability to meet new Tribal energy demands. Reclamation has concluded that the reduction in power produced at Headgate as a result of the water transfers is not an Indian Trust Asset, and Reclamation does not propose to mitigate or compensate for this reduced opportunity to produce power.
Coachella Valley Water District. Potential for adverse impacts to tribal resource from groundwater recharge.	No additional Colorado River water would be provided to CVWD, and overdrafted groundwater conditions would continue.	Groundwater recharge with Colorado River water is anticipated to have an adverse impact on the quality of groundwater extracted near the recharge basins in the Lower Coachella Valley because Colorado River water typically has higher concentrations of TDS and other chemical constituents than the local groundwater currently does. Recharge with

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 23 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Colorado River water could introduce low levels of perchlorate into the groundwater near the recharge basins. Groundwater recharge would affect the groundwater supply of the Torres Martinez Band of Desert Cahuilla Indians. CVWD would work with the Tribe to bring the drinking water supply of the Tribe into compliance by either providing domestic water service or by providing appropriate well-head treatment should recharge of Colorado River water cause any Torres Martinez drinking water well to exceed any recognized health based water quality standard.
Salton Sea. Potential for adverse impacts to tribal resources from decreased water levels and water quality of the Salton Sea.	Decreased water levels and increased salinity of the Sea would have negative impacts to the area's biological and recreational resources, and would expose currently inundated lands of the Torres Martinez Reservation.	Lowered water surface elevation of the Salton Sea would result in the exposure of Torres Martinez Band of Desert Cahuilla Indians' tribal land that is currently inundated by the Salton Sea. These exposed lands contain natural and cultural resources that are considered by the Tribe to be ITAs. Exposure could result in adverse impacts on cultural resources from vandalism and erosion. Flowage easements held over these lands by CVWD and IID would severely limit most economic development opportunities. The Tribe is quite concerned with any impact to the fishery resource or recreational economy. The Tribe also has expressed concern about increases in wind-blown dust from the exposure of lands previously inundated by the Salton Sea
TRIBAL RESOURCES		
Inadvertent Overrun Policy		
The IOP could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	None.	Proposed IOP: Impacts to cultural resources are to be evaluated separately from this EIS. Regarding hydroelectric power, the IOP would have positive impacts on power production during overrun years and negative impacts during payback years. Power production at Hoover, Davis, Parker, and Headgate

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 24 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Rock Dams would be impacted. No Forgiveness Alternative: Impacts would be as described for the proposed action.
Biological Conservation Measures		
The Biological Conservation Measures could impact Tribal resources along the lower Colorado River through impacts on hydrology/water rights, water quality, biological resources, cultural resources, land use, or hydroelectric power.	None.	There could be a short-term impact to water quality associated with construction of habitat restoration sites. Potential short-term impact to biological and cultural resources could occur depending on the locations selected to implement the conservation measures. Regarding hydroelectric power, implementation of the biological conservation measures would have no impact on power generation.
	AIR QUALITY	
Implementation Agreement		
Colorado River. Potential for increase in windblown fugitive dust emissions from decreased water levels of the Colorado River between Parker Dam and Imperial Dam.	None.	The amount of land exposed by decreased water levels is relatively small and some may become revegetated. Potential for increase in windblown fugitive dust emissions from these periodically dry lands would be minimal.
	AIR QUALITY	
Imperial Irrigation District. Potential air quality impacts from construction and operation of water conservation measures.	There is a potential for water conservation measures to be implemented in the IID service area even if the IA and QSA were not implemented. This could result in air quality impacts that are similar to those described in the proposed action.	The impact of emissions from construction of on-farm water conservation measures and water treatment/reuse systems would not exceed any ambient air quality standard. Fugitive dust emissions from soil disturbances are considered to be within the realm of typical farm operations. Conservation measures also could include fallowing, which could result in a decrease in combustive emissions. Fallowed lands would no longer be subject to plowing and other agricultural activities that would create windblown dust, but the exposed area of the fallowed lands could in itself create some windblown dust.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 25 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
Coachella Valley Water District. Potential air quality impacts from construction and operation of new facilities.	There is the likelihood that some of the facilities considered in the proposed action may still be constructed in the CVWD service area to accommodate other elements of the CVWMP not directly related to the IA and QSA. This could result in air quality impacts that are similar to those described in the proposed action. CVWD might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the State Water Project (SWP) or groundwater, or further development of new supplies through recycling or desalination. Some of these actions might require construction, which would have air quality impacts.	The impact of emissions from construction of new facilities would cause temporary impacts to local air quality and could exceed air emission thresholds established by the South Coast Air Quality Management District (SCAQMD) within the South Coast Air Basin (SCAB) project region. Mitigation measures for this impact will be identified in the Programmatic Environmental Impact Report (PEIR) being prepared by CVWD for the CVWMP or in project-level documents prepared for the construction of specific program components. Operation of facilities associated with implementation of the IA and QSA within the CVWD service area would have minimal impacts on air quality.
AIR QUALITY		
Metropolitan Water District. No new construction or changes in the operation of existing facilities.	The reliability of Colorado River water supplies would not be increased for MWD under this alternative, and this agency might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. Some of these actions might require construction, which would have air quality impacts.	None.
San Diego County Water Authority. No new construction or changes in the operation of existing facilities.	The reliability of Colorado River water supplies would not be increased for SDCWA under this alternative, and this agency might undertake other actions to increase their overall water supply reliability. These actions might include increased water conservation, increased reliance on other water supplies, such as the SWP or groundwater, or further development of new supplies through recycling or desalination. Some of these actions	None.

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
	might require construction, which would have air quality impacts.	
AIR QUALITY		
Salton Sea. Potential increase in dust emissions from decreased water levels of the Salton Sea and potential increase in odorous emissions from decreased water quality of the Sea.	The Salton Sea is expected to decline from its current elevation under the No-Action Alternative (i.e., no water transfers). The soils along the Salton Sea shoreline have a moderate potential for wind-blown dust. Dust emissions from these areas would in part be due to the level of human disturbances, such as vehicle activities, or from subsequent wind erosion. The reduction of water flow into the Salton Sea could increase odorous emissions in proximity to this body of water.	IID would undertake conservation actions that have the potential to reduce inflows to the Salton Sea. Depending on how the conservation is accomplished, the impact on inflows from IID could range from essentially no change to a substantial reduction. Under most scenarios, the Salton Sea would shrink at a faster rate than under No Action. IID determined that the project would produce significant amounts of windblown dust from the exposed shoreline of the Salton Sea. IID proposes to implement a program to mitigate dust emissions that could occur from the exposed shorelines. IID indicates that a level of uncertainty would remain regarding whether or not the mitigation program would reduce short-term and long-term impacts from dust emissions that could occur from the exposed Salton Sea shorelines. This impact, therefore, remains potentially significant and unavoidable. Given the complexity of the interrelationship of phosphate inputs, water quantity, and water quality, it is not possible to quantify the effect the proposed action would have on odorous emissions in the Salton Sea. However, compared to the existing conditions and projected continuation of eutrophication conditions at the Salton Sea, the effects of the proposed action on odors is expected to be minimal.
Inadvertent Overrun Policy		
Potential air quality impacts from increases and decreases in the Colorado River flow during select portions of the 75-year time period.	None.	Proposed IOP: Implementation of the IOP would produce minimal air quality impacts to this region. If the IOP resulted in the need to fallow fields in the IID service area in order to conserve water to

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		payback an overrun, this impact would generally produce a beneficial impact to air quality, as the elimination of cultivation from these areas would reduce the amount of fugitive dust generated from these areas; unless the fallowed soils were treated with a soil stabilizer, however, they would generate some windblown dust. No Forgiveness Alternative: Impacts would be as described for the proposed action.
Biological Conservation Measures		
Potential increase in combustive emissions due to the use of fossil fuel-fired construction equipment and increase in fugitive dust emissions due to ground-disturbing activities from restoration or creation of 44 acres of backwaters along the Colorado River between Parker Dam and Imperial Dam.	None.	It is expected that the impact of emissions from construction activities would not exceed any ambient air quality standard. Implementation of fugitive dust control measures would effectively minimize PM10 emissions from these activities.
Potential increase in combustive emissions due to the use of fossil fuel-fired construction equipment and increase in fugitive dust emissions due to ground-disturbing activities from restoration or creation of up to 1,116 acres of southwestern willow flycatcher habitat along the Colorado River.	None.	It is expected that the impact of emissions from construction activities would not exceed any ambient air quality standard. Implementation of fugitive dust control measures would effectively minimize PM10 emissions from these activities.
TRANSBOUNDARY IMPACTS		
Implementation Agreement		
Potential changes to the probability and magnitude of excess flows to Mexico.	<u>Hydrology</u>. From years 2002 to 2026, the probability of excess flows varies from 20 to 25 percent. After 2030, the probability of flood flows decreases to 10 to 15 percent. The magnitude of flood flows varies from 0 to over 6 MAF, with large flood flows (over 250 KAF) anticipated approximately 20 percent of the time and flood flows over 1 MAF less than 15 percent of time.	<u>Hydrology</u>. The probability and magnitude of excess flows to Mexico is similar but occasionally higher under the IA.

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 28 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
TRANSBOUNDARY IMPACTS		
Potential impacts to habitat and species in Mexico.	Biological Resources**.** It is anticipated that flood flow frequency and quantities would be reduced under the No-Action Alternative. This may result in some reduction of wildlife habitat through the reduction in flows reaching the Delta area. It is expected, however, that much of the existing habitat would remain as it is since most of the riparian habitat is composed of salt cedar, which would be fed by groundwater. No measurable impact is expected to sensitive marine species.	Biological Resources**.** The IA would result in a flood flow probability and magnitude that are generally equal to, or somewhat greater than, the No-Action Alternative. Therefore, this action would have no potential impact on any federally listed species in Mexico.
Inadvertent Overrun Policy		
Potential changes to the probability and magnitude of excess flows to Mexico.	See *Hydrology* above.	Hydrology. Proposed IOP: The inadvertent overrun and payback policy does not apply to Mexico. However, actions undertaken by IOP users could affect excess flows to Mexico. The overall impact of the IOP would be to decrease both the probability of a flood release and the magnitude of a flood release. Combined, the IA and IOP reduce probability of a flood release by 1.2 to 3.5 percent in some of the years modeled. In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered an average Lower Basin Overrun Account Balance of 66 KAFY modeled conditions, in approximately 16 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 35,811 AF. In the evaluation of the comparison of the differences in the observed excess flows below Morelos Dam between the No Action and the IA that considered a Lower Basin Overrun Account

Table 2.5-1. Summary of Potential Impacts of the Execution of the IA, Adoption of the IOP, and Implementation of Biological Conservation Measures (Page 29 of 29)

Resource/Issue	*No Action*	*Impacts of Proposed Action/Alternatives*
		Balance of 331 KAFY modeled conditions, in approximately 11.7 percent of instances where differences were observed, the differences were positive which represented an increase in the magnitude of excess flows. However, for the 75-year period of analysis, the average of the differences was a reduction of 219,539 AF. No Forgiveness Alternative: Impacts would be as described for the proposed action.
TRANSBOUNDARY IMPACTS		
Potential impacts to habitat and species in Mexico.	See *Biological Resources* above.	<u>Biological Resources</u>**.** No substantive impacts to vegetation are anticipated. It is anticipated that impacts to fish and wildlife species within the Delta area and within the Sea of Cortez would be negligible or nonexistent. Habitat is expected to remain much as it is today, and there would be no appreciable change in habitat quality for fish and wildlife. The IOP would have no impact on special status species.
Biological Conservation Measures		
No biological conservation measures would be implemented downstream of Imperial Dam; thus, they would not impact water resources in Mexico.	None.	None.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
Priority 3a Colorado River water capped at 3.1 MAFY IID consensually limits its consumptive use of Priority 3a water to a specified amount of 3.1 MAFY subject to adjustment as provided in the QSA and the IOP.	Secretary shall deliver Colorado River water to Imperial Dam in an amount up to, but not more than, IID's Priority 3a cap as defined in the IA or as may be acquired under the QSA subject to Secretarial approval where necessary.	1. This EIS provides NEPA compliance for the Secretary's delivery of Colorado River water in conformance with IID's Priority 3a cap (as defined in the IA and QSA). 2. The QSA PEIR provides program level CEQA compliance for IID's Priority 3a cap (as defined in the IA and QSA). 3. Project-level CEQA compliance for IID's Priority 3a cap (as defined in the IA and QSA) is provided in the IID Water Conservation and Transfer Project EIR/EIS.
IID/MWD 1988 Agreement, IID/MWD/PVID/CVWD 1989 Approval Agreement, and MWD/CVWD 1989 Agreement to Supplement Approval Agreement MWD would forego, and would not be charged with, the use of 20 KAFY of IID conserved water. CVWD would be allowed the use of 20 KAFY of this water under terms of the 1989 IID/MWD/PVID/CVWD Approval Agreement, and MWD/CVWD Supplemental Agreement, as amended.	Secretary shall continue to deliver Colorado River water to Lake Havasu in an amount equal to that amount of water conserved by IID for the benefit of MWD in accordance with the provisions of the amended 1988 and 1989 Agreements and the IA. Secretary shall deliver Colorado River water to Imperial Dam in the amount of 20 KAFY for the benefit of CVWD in accordance with the provisions of the amended 1989 Agreements, and the IA.	1. This EIS provides NEPA compliance for the change in point of delivery of 20 KAFY from Lake Havasu to Imperial Dam. 2. This EIS provides NEPA compliance for the Secretary's reduced delivery to MWD, and increased delivery to CVWD, of this water. 3. NEPA compliance for the 1988 IID/MWD Agreement was provided by Categorical Exclusion No. LC-89-2, dated January 6, 1989. 4. Program level CEQA compliance for the IID/MWD 1988 Agreement was included in the 1986 IID Proposed Water Conservation Program and Initial Water Transfer EIR. 5. CEQA compliance for the IID/MWD 1988 Agreement was included in 1994 IID Modified East Lowline and Trifolium Interceptors, and Completion Projects EIR. 6. CEQA compliance for MWD use of conserved water for the 1989 Approval Agreement was included in the 1986 IID Proposed Water Conservation Program and Initial Water Transfer EIR. 7. CEQA compliance for CVWD use of conserved water will be included in the Coachella Valley Water Management Plan PEIR. 8. The QSA PEIR provides project-level CEQA compliance for MWD's reduction in use of conserved water. 9. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of 20 KAFY from Lake Havasu to Imperial Dam.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
IID/SDCWA Transfer of conserved water (up to 200 KAFY) An amount of water equivalent to the amount of water conserved in the IID service area would be transferred to SDCWA. At SDCWA's election, the water would be delivered to Lake Havasu.	Secretary shall deliver Colorado River water to Lake Havasu in an amount equal to that amount of water conserved by IID for the benefit of SDCWA in accordance with the provisions, including the point of delivery of the 1998 IID/SDCWA Water Conservation and Transfer Agreement and the IA.	1. This EIS provides NEPA compliance for the change in point of delivery of up to 200 KAFY from Imperial Dam to Lake Havasu. 2. This EIS provides programmatic NEPA compliance for the IID/SDCWA Water Conservation and Transfer Agreement, as modified by the QSA. 3. Project-level NEPA and CEQA compliance for the water conservation and transfers by IID, and for the Habitat Conservation Plan for impacts to the IID service area and Salton Sea is provided in the IID Water Conservation and Transfer Project EIR/EIS. 4. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of up to 200 KAFY from Imperial Dam to Lake Havasu. 5. The QSA PEIR provides program level CEQA compliance for the IID/SDCWA Water Conservation and Transfer Agreement. 6. Project-level CEQA compliance for this component of the QSA is provided in the IID Water Conservation and Transfer Project EIR/EIS.
MWD/SDCWA Exchange of conserved water (up to 200 KAFY) SDCWA would exchange water conserved by IID under the IID/SDCWA Water Conservation and Transfer Agreement with MWD; MWD would divert that water into the CRA at Lake Havasu; MWD would deliver an equivalent amount of water to SDCWA at the SDCWA/MWD delivery point in San Diego County.	No Federal action required.	1. No NEPA compliance is required for the MWD/SDCWA Exchange of Conserved Water Agreement. 2. The QSA PEIR provides project-level CEQA compliance for the MWD/SDCWA Exchange of Conserved Water Agreement. 3. CEQA Notice of Exemption was prepared by SDCWA for the MWD/SDCWA Exchange of Conserved Water Agreement.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
IID/CVWD/MWD Transfer of conserved water (up to 100 KAFY, also known as the First and Second 50 KAFY) **First 50 KAFY** An amount of water equivalent to the amount of water conserved in the IID serve area, which CVWD elects to acquire, would be made available at Imperial Dam; any amount not acquired by CVWD may be acquired by MWD, and could be diverted at Lake Havasu. **Second 50 KAFY** An amount of water equivalent to the amount of water conserved in the IID service area, which CVWD elects to acquire, would be made available at Imperial Dam; any amount not acquired by CVWD may be acquired by MWD, and could be diverted at Lake Havasu. After year 45, MWD would bear the obligation to provide the Second 50 KAFY to CVWD.	Secretary shall deliver Colorado River water to Imperial Dam in an amount equal to that amount of water conserved by IID for the benefit of CVWD in accordance with the provisions of the IA. In the event CVWD may decline a portion of this water, the Secretary shall instead deliver such portion of water to IID or MWD in accordance with the provisions of the IA. Secretary shall deliver Colorado River water to Imperial Dam in the amount of up to 50 KAFY of water made available by MWD in Year 46 and thereafter, for the benefit of CVWD in accordance with the provisions of the IA.	1. This EIS provides NEPA compliance for the potential change in point of delivery of up to 100 KAFY from Imperial Dam to Lake Havasu, and for delivery of conserved water to CVWD and/or MWD. 2. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of up to 100 KAFY from Imperial Dam to Lake Havasu. 3. The QSA PEIR provides program level CEQA compliance for this water conservation and transfer component. 4. Project-level NEPA and CEQA compliance for the water conservation and transfers by IID, and for the HCP for impacts to the IID service area and Salton Sea is provided in the IID Water Conservation and Transfer Project EIR/EIS. 5. CEQA compliance for CVWD use of conserved water will be included in the CVWMP PEIR. 6. The QSA PEIR provides project-level CEQA compliance for MWD use of any amount of conserved water not acquired by CVWD. 7. After Year 45, MWD would bear the obligation to provide the Second 50 KAFY to CVWD. The source of water and mechanisms for MWD to fulfill this obligation are speculative at this time and may be subject to further NEPA compliance in the future.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
Transfer of conserved water (67.7 KAFY) An amount of water equivalent to the amount of water conserved by lining a section of the AAC would be diverted by MWD (56.2 KAFY) and delivered to San Luis Rey Indian Water Rights Settlement Parties (11.5 KAFY) via MWD and SDCWA facilities.	Secretary shall deliver Priority 3a Colorado River water to Lake Havasu in an amount equal to that amount of water conserved by lining this section of the AAC to MWD, and/or to IID, and make available Colorado River water for the benefit of the San Luis Rey Indian Water Rights Settlement Parties in accordance with the provisions of the IA and section 106 of Public Law 100-675.	1. NEPA compliance for the All-American Canal lining was provided in the All-American Canal Lining Project EIS/EIR. 2. Environmental impacts from the use of conserved water by MWD were described in the All-American Canal Lining Project EIS/EIR, and are also described in this EIS. 3. NEPA compliance for the change in point of delivery of up to 67.7 KAFY from Imperial Dam to Lake Havasu was provided in the All-American Canal Lining Project EIS/EIR, and is supplemented by this EIS. 4. This EIS provides NEPA compliance for the delivery of water for implementation of the San Luis Rey Indian Water Rights Settlement Act, and describes the environmental impacts from the use of this water by the City of Escondido, and Vista Irrigation District. 5. Use of water by the Indian Bands is not included in this EIS and would require additional NEPA compliance. 6. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of up to 67.7 KAFY from Imperial Dam to Lake Havasu. 7. CEQA compliance for canal lining was included in the All-American Canal Lining Project EIS/EIR. 8. CEQA compliance for use of the conserved water in the MWD service area was provided in the All-American Canal Lining Project EIS/EIR. 9. The QSA PEIR provides project-level CEQA compliance for the diversion of water for implementation of the San Luis Rey Indian Water Rights Settlement Act. 10. The QSA PEIR provides project-level CEQA compliance for use of the conserved water by the City of Escondido, and Vista Irrigation District through implementation of the San Luis Rey Indian Water Rights Settlement Act.
Priority 6a Colorado River priorities and volume allocations Diversion of Priority 6a water in the following priorities and volumes: 38 KAFY to MWD, 63 KAFY to IID, and 119 KAFY to CVWD, when available.	Secretary shall deliver Priority 6a Colorado River water, when available, to the diversion points for MWD, IID, and CVWD in the following order and volumes: (i) 38 KAFY to MWD; (ii) 63 KAFY to IID; and (iii) 119 KAFY to CVWD in accordance with the provisions of the IA.	1. This EIS provides NEPA compliance for the Secretary's delivery of this water for use by MWD, IID, and CVWD. 2. The QSA PEIR provides project-level CEQA compliance for Priority 6a Colorado River priority and volume allocations, including use by MWD within the MWD service area.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
Priority 3a Colorado River capped at 330 KAFY CVWD consensually limits its consumptive use of Priority 3a water to a specified amount of 330 KAFY, subject to adjustment as provided in the QSA and the IOP.	Secretary shall deliver Colorado River water to Imperial Dam in an amount up to, but not more than, CVWD's Priority 3a cap as defined in the IA or as may be acquired under the QSA subject to Secretarial approval where necessary.	1. This EIS provides NEPA compliance for the Secretary's delivery of Colorado River water in conformance with CVWD's Priority 3a cap (as defined in the IA and QSA). 2. QSA PEIR provides project-level CEQA compliance for CVWD's Priority 3a cap (as defined in the IA and QSA).
Transfer of conserved water (26 KAFY) An amount of water equivalent to the amount of water conserved by lining portions of the Coachella Canal would be diverted by MWD (21.5 KAFY) and delivered to San Luis Rey Indian Water Rights Settlement Parties (4.5 KAFY) via MWD and SDCWA facilities.	Secretary shall deliver Priority 3a Colorado River water to Lake Havasu or Imperial Dam in an amount equal to the amount of water conserved by lining the unlined portions of the Coachella Canal to MWD, and/or to IID, and make available Colorado River water for the benefit of the San Luis Rey Indian Water Rights Settlement Parties, in accordance with the provisions of the IA and section 106 of Public Law 100-675.	1. NEPA compliance was provided for the Coachella Canal lining project in the Coachella Canal Lining Project EIS/EIR. 2. Environmental impacts from the use of the conserved water by MWD were described in the Coachella Canal Lining Project EIS/EIR, and are also described in this EIS. 3. This EIS provides NEPA compliance for the delivery of water for implementation of the San Luis Rey Indian Water Rights Settlement Act, and describes the environmental impacts from the use of this water by the City of Escondido, and Vista Irrigation District. 4. NEPA compliance for the change in point of delivery of up to 26 KAFY from Imperial Dam to Lake Havasu was provided in the Coachella Canal Lining Project EIS/EIR, and is supplemented by this EIS. 5. Use of water by the Indian Bands is not included in this EIS and would require additional NEPA compliance. 6. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of up to 26 KAFY from Imperial Dam to Lake Havasu. 7. CEQA compliance for canal lining was included in the Coachella Canal Lining Project EIS/EIR. 8. CEQA compliance for use of the conserved water in the MWD service area was provided in the Coachella Canal Lining Project EIS/EIR. 9. The QSA PEIR provides project-level CEQA compliance for the diversion of water for implementation of the San Luis Rey Indian Water Rights Settlement Act. 10. The QSA PEIR provides project-level CEQA compliance for use of the conserved water by the City of Escondido, and Vista Irrigation District through implementation of the San Luis Rey Indian Water Rights Settlement Act.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
Transfer of water (35 KAFY) MWD would transfer 35 KAFY of its SWP entitlement to CVWD. CVWD would deliver 35 KAFY of its SWP entitlement to MWD at the Devil Canyon Afterbay, in exchange, MWD would forgo the use of 35 KAFY of Colorado River water for use by CVWD.	Secretary shall deliver Colorado River water to Imperial Dam in the amount of 35 KAFY for the benefit of CVWD, in accordance with the provisions of the IA. Per the MWD/CVWD SWP Transfer and Exchange Agreement, water may be delivered elsewhere.	1. This EIS provides NEPA compliance for the change in point of delivery of up to 35 KAFY from Lake Havasu to Imperial Dam, and describes the environmental impacts from the use of the 35 KAFY by CVWD. 2. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion of up to 35 KAFY from Lake Havasu to Imperial Dam. 3. Project-level CEQA compliance for the use of this water by CVWD will be included in the CVWMP PEIR.
Over and Under Run of Priorities 1, 2 and 3b MWD shall be responsible, when necessary, in conjunction with the IOP for repayment of any overrun as a result of the aggregate use by Priorities 1, 2 and 3b in excess of 420 KAFY; to the extent that Priorities 1, 2 and 3b use less than 420 KAFY, MWD shall have the exclusive right to consumptively use such unused water.	Secretary shall deliver Colorado River water in accordance with the provisions of the IA and IOP.	1. This EIS describes the environmental impacts of MWD's repayment of any overrun as a result of the aggregate use by Priorities 1, 2 and 3b in excess of 420 KAFY, and for MWD's use of unused Priorities 1, 2 and 3b in the event that these priorities use less than 420 KAFY. 2. The QSA PEIR provides project-level CEQA compliance for this QSA component.
Use by Miscellaneous and Federal Present Perfected Rights, including certain Indian Reservations Water forborne, when necessary, by CVWD and IID in the amount of 3 and 11.5 KAFY respectively, and water forborne by MWD in the aggregate amount in excess of 14.5 KAFY necessary to satisfy Miscellaneous and Federal PPR's, including Indian Reservations (amount forborne by MWD has been estimated by Reclamation at 47 KAFY).	Secretary may reduce the amount of water otherwise available for consumptive use to IID and CVWD by up to 11.5 KAFY and up to 3 KAFY, respectively, as a result of the satisfaction within the State of California of the Miscellaneous and Federal PPRs recognized in the Decree. The Secretary may reduce the amount of water otherwise available for MWD's consumptive use by the amount necessary to satisfy within the State of California the Miscellaneous and Federal PPRs, recognized in the Decree and not within Priority 2 of the Seven Party Agreement to the extent those uses exceed 14.5 KAFY.	1. This EIS provides NEPA compliance for the Secretary's reduced delivery of water to IID, CVWD, and MWD due to future use by Miscellaneous and certain Indian PPR holders, and for the change in points of delivery from Lake Havasu and Imperial Dam to various points along the Colorado River in the Lower Basin. 2. The QSA PEIR provides program level CEQA compliance for this QSA component. 3. The QSA PEIR provides project-level CEQA compliance for the change in point of diversion from Lake Havasu and Imperial Dam to various points along the Colorado River in the Lower Basin, due to the future use by Miscellaneous and certain Indian PPR holders. 4. Project-level CEQA compliance for IID's forbearance is included in the IID Water Conservation and Transfer Project EIR/EIS. 5. Project-level CEQA compliance for CVWD's forbearance will be included in the Coachella Valley Water Management Plan PEIR.

Table 2.2-1. QSA Component, IA Federal Action and Associated Environmental Review[1]

Quantification Settlement Agreement Component	*Implementation Agreement Federal Action*	*Associated Environmental Documentation*
Shortage Sharing Agreement If there is less than 3.85 MAF of Colorado River water available under Priorities 1, 2, and 3 in any one year during the 75-year quantification period, there would be no termination of the QSA. Shortages would be shared pursuant to the particular provisions of the Acquisition Agreements[2] and the Allocation Agreement[3].	If, for any reason, there is less than 3.85 MAFY available under Priorities 1, 2, and 3 during the quantification period, any water that is made available by the Secretary to IID shall be delivered to IID, CVWD, MWD, and SDCWA in accordance with the shortage sharing provisions in the IA and the Acquisition Agreements[2].	1. This EIS provides NEPA compliance for the Secretary's water deliveries per the shortage sharing provisions among IID, MWD, CVWD and SDCWA. 2. The QSA PEIR provides project-level CEQA compliance for the impacts of the shortage sharing provisions among IID, MWD, CVWD and SDCWA.

(1) All QSA Components and IA Related Federal Actions would terminate prior to, or at the end of the quantification period pursuant to the terms and conditions of the IA and QSA, with the exception of the water transferred to the San Luis Rey Indian Water Rights Settlement Parties. The Secretary shall continue to deliver up to 16 KAFY for the benefit of the San Luis Rey Indian Water Rights Settlement Parties as identified in the IA and QSA.

(2) The Acquisition Agreements are collectively the IID/SDWCA Water Conservation and Transfer Agreement, the IID/SDCWA Early Water Transfer Agreement, the CVWD/MWD Acquisition Agreement, the IID/MWD Acquisition Agreement, the IID/CVWD Acquisition Agreement, and the MWD/CVWD SWP Transfer and Exchange Agreement.

(3) The Allocation Agreement is an agreement among the City of Escondido, PVID, SDCWA, San Luis Rey River Indian Water Authority, Vista Irrigation District, the La Jolla, Pala, Pauma, Rincon and San Pasqual bands of Mission Indians, and the Secretary concerning the allocation of conserved water created by the All-American and Coachella Canal lining projects.

Table 3.1-9. Projected Salt Balance in Coachella Valley with Implementation of the CVWMP in Year 2035

	FUTURE WITHOUT CVWMP			FUTURE WITH CVWMP		
Inputs (tons/yr)	*Upper Valley*	*Lower Valley*	*Total*	*Upper Valley*	*Lower Valley*	*Total*
Natural Recharge	16,000	2,000	18,000	16,000	2,000	18,000
SWP Recharge	51,000	0	51,000	104,000	0	104,000
Canal Water	0	360,000	360,000	44,000	539,000	583,000
Salton Sea Intrusion	0	164,000	164,000	0	32,000	32,000
Fish Farm/Duck Club Reuse	0	1,000	1,000	0	0	0
Input from Upper Valley	14,000	13,000	27,000	12,000	12,000	24,000
Domestic Use Increment	7,000	18,000	25,000	6,000	18,000	24,000
Fertilizers	0	2,000	2,000	0	6,000	6,000
Total Salt Addition	**88,000**	**560,000**	**648,000**	**182,000**	**609,000**	**791,000**
Salt Removal (tons/yr)						
Drain Flows	0	118,000	118,000	0	625,000	625,000
Outputs to Salton Sea	0	1,000	1,000	0	4,000	4,000
Fish Farm/Duck Club Pumping	0	8,000	8,000	0	8,000	8,000
Municipal Wastewater Discharge	0	15,000	15,000	0	9,000	9,000
Output to Lower Valley	2,000	0	2,000	6,000	0	6,000
Total Salt Removed	**2,000**	**142,000**	**144,000**	**6,000**	**646,000**	**652,000**
Net Salt Added	86,000	418,000	504,000	176,000	-37,000	139,000
Average TDS Increment (mg/L/yr)	**7.3**	**19.6**		**11.1**	**-1.6**	
Source: unpublished data CVWD						

Table 3.7-4. Residential Construction (units) by County, 1990-1999

County	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*Average 1990-1999*
California											
Imperial	1,087	837	1,001	627	834	492	352	342	433	339	634
Los Angeles	25,125	15,914	11,965	7,432	7,754	7,763	7,731	9,829	11,226	14,050	11,879
Orange	11,983	6,555	5,821	6,344	12,640	8,193	10,173	12,251	9,704	12,239	9,590
Riverside	15,362	9,283	8,220	7,274	8,015	6,806	7,540	9,747	12,527	14,154	9,893
San Bernardino	13,250	6,809	7,251	5,778	4,809	3,892	4,822	5,448	6,127	6,767	6,495
San Diego	15,732	7,891	6,071	5,750	6,943	6,633	6,848	11,139	11,891	16,295	9,519
Ventura	2,620	2,194	1,720	1,372	2,456	2,142	2,321	2,329	3,298	4,418	2,487
Arizona											
La Paz	24	40	27	25	31	24	36	36	38	38	32
Mohave	3,187	1,930	2,315	1,989	2,190	1,732	1,446	1,692	1,961	1,944	2,039
Yuma	819	561	619	637	776	773	1,151	1,057	1,039	1,047	848
Nevada											
Clark	27,703	17,864	13,429	19,036	25,570	27,813	30,935	29,176	30,644	26,856	24,903

Source: U.S. Census Bureau, Manufacturing and Construction Division, Residential Construction Branch. Housing Units Authorized by Building Permits, 1990 through 1999.

Table 3.9-1. Cultural Features Shown on Government Land Office (GLO) Township Survey Plats that May be Located in the Implementation Agreement Area of Potential Effect[1]

Resource Number[2]	*7.5' USGS Quadrangle[3]*	*State*	*Plat Date*	*Resource Description*
1715	Gene Wash	AZ	1919	A shack at boundary of APE. At edge of Colorado River in T11N R18W S32.
1718	Gene Wash	AZ	1919	A ditch—small segment at APE boundary in T11N R18W S27 & S24.
1182	Parker	AZ/CA	1912	An Atchison Topeka & Santa Fe Railway crosses APE on bridge N of Parker, Arizona.
1183	Parker	AZ	1912	A hut at GLO point plotted in channel of Colorado River, in T1N R25E S25. If there was a resource at this location it has likely been destroyed as a result of post-1912 meandering of channel.
1184	Parker	CA	1912	A highway—small segment at E end may be located in APE. E end terminates near center of Colorado River in T1N R25E S25.
1181	Parker	CA	1912	A highway—NE end crosses into APE & terminates on W bank of Colorado River SW of a trailer park in T1N R26E S19.
1178	Parker	CA	1912	Fences—linear feature paralleling W bank of Colorado River. Noted on USGS 7.5' quad as Old Parker Road.
No #	Parker SE	AZ	unk	Unlabeled linear feature terminating on S (AZ) bank of the Colorado River in T9N R25E S20 NE1/4.
1737	Parker SW	AZ	1914	A fence—W end terminates at E edge of APE, near 15th Avenue & E bank of Colorado River.
1638	Parker SW	AZ	1914	A fence—NW end terminates at Gaging Station at corner common to T6N R22 W S16, S15, S21 & S22.
1636	Poston	AZ/CA	1914	A road—linear feature crossing Colorado River. Crosses into APE in T7N R22W S1 SE1/4.
1645	Poston	AZ	1914	A fence—U-shaped feature in T7N R21W S6 SW1/4 & T7N R22W S1 SE1/4. W1/2 appears to be in modern river channel. Colorado River Indian Tribes (CRIT) Reservation.
1667	Poston	AZ	1914	A well—situated along S arm of u-shaped fence in T7N R21W S6 SW1/4. At edge of APE.
1648	Big Maria Mtns. NE	AZ	1914	A fence—W end in APE in T7N R22W S14 NE1/4. CRIT Reservation.
1660	Big Maria Mtns. SE	AZ/CA	1914	A Parker-Blythe Telephone Line—W end terminates in APE at E bank of river channel in T6N R22W S34. CRIT Reservation.
1062	Blythe NE	CA	1874	An Indian Trail—small segment paralleling alignment of modern canal at W edge of APE in T6S R23E S23.
1065	Blythe NE	CA	1874	An Indian Trail—small segment crosses into APE in T6S R23E S23 SE1/4.

Table 3.9-1. Cultural Features Shown on Government Land Office (GLO) Township Survey Plats that May be Located in the Implementation Agreement Area of Potential Effect[1]

Resource Number[2]	*7.5' USGS Quadrangle[3]*	*State*	*Plat Date*	*Resource Description*
1059/1060	Blythe	AZ/CA	1874	Noted as a wagon road on AZ side; a San Bernardino Road on CA side. Crosses into APE NW of Ehrenberg.
1549	Palo Verde	AZ/CA	1904	A wire fence crosses APE in T1N R24W S21 NE1/4.
1546	Palo Verde	AZ/CA	1904	A Cibola Canal crosses APE in T1N R24W S21 NE1/4.
1544	Palo Verde	CA	1904	A corral in APE, E of C-28 Canal, between levee & Colorado River.
1000	Cibola	CA	1857	An Indian Trail—fragment of NE-SW trending linear feature. Passes into APE in T9S R21E S25 NE1/4.
1793	Cibola	AZ	1904	A road from A.W. Frankenberg's House to A.A. Hanna House—crosses relocated channel of Colorado River in T10S R21E S23 NE1/4. If there was a portion of this feature within the APE at this location, it was likely destroyed by channel relocation.
1794	Cibola	AZ	1904	A.W. Frankenberg's House—in relocated channel of Colorado River in T10S R21E S23 NE1/4. If remnants of this resource existed at this location, the remains were likely destroyed by channel relocation.
1795	Cibola	AZ	1904	A ditch—new channel intersects SW end in T10S R21E S23 NE1/4. If present, portion in APE was likely destroyed by channel relocation.
1820	Cibola	AZ	1904	M.E. Hanna Desert Land Claim—APE along new channel passes through SW portion of claim in T10S R21E S24 SW1/4.
1822	Cibola	AZ	1904	A fence—crosses APE along new channel in T10S R21E S24 SW1/4.
1823	Cibola	AZ	1904	J.E. Downs Desert Land Claim—APE along new channel passes through W portion of claim in T10S R21E S24 SE1/4 & S25 NE1/4.
1824	Cibola	AZ	1904	J.E. Snow Desert Land Claim—APE along new channel passes though center of claim in T10S R21E S25 NE1/4 & T1S R25W S30 NW & SW1/4s.
1831	Cibola & Picacho NW	AZ	1904	A road—linear feature passes in & out of APE on both quads. Feature crosses APE along new channel inT10S R21E S25 NE1/4. S end terminates in APE in T12S R24W S24 at edge of Colorado River on AZ side, across from Draper Ranch.
1825	Cibola	AZ	1904	Part of Julia A. Anderson's Desert Land Claim—APE along new channel passes through E1/2 of claim in T1S R25W S30 SW1/4 & S31NW1/4.
1828	Cibola	AZ	1904	Edward Atkinson's Desert Land Claim—APE along new channel passes through E1/2 of claim in T1S R25W S31 NW & SW 1/4s.
1842	Cibola	AZ	1904	A ranch @ GLO polygon, extends into APE along old channel, & abuts boundary of APE along new channel in T11S R 25W S18 NE1/4.

Table 3.9-1. Cultural Features Shown on Government Land Office (GLO) Township Survey Plats that May be Located in the Implementation Agreement Area of Potential Effect[1]

Resource Number[2]	*7.5' USGS Quadrangle[3]*	*State*	*Plat Date*	*Resource Description*
1847	Cibola	AZ	1904	A ranch—GLO point, appears to be located in backwater, in APE along new channel, in T11S R25W S18 NW1/4.
1844	Picacho NW	AZ	1904	A fenced field—plot extends into APE on AZ side in T2S R23W S19 SW1/4 & S30 NE1/4.
1845	Picacho NW	AZ	1904	S. Lopez House—GLO point at edge of APE & within a fenced field, polygon in T2S R23W S30 NE1/4.
1016	Picacho NW	CA	1879	A trail—long, linear feature on floodplain, extending S from Walter's Camp & terminating at Draper Lake. May be equivalent to linear feature denoted by points assigned site #s 4-IMP-898 & 4-IMP-897.
1860	Picacho NW	AZ	1920	An adobe house—GLO point, possibly equivalent to a feature at Clip Mill (AZ R:14:16 [ASM]). Point plot touches boundary of APE. If remnants of this feature exist at this location they are most likely situated in an elevated location above the floodplain, beyond the boundary of the APE.
1859	Picacho NW	AZ	1920	A road—intersects GLO Resource # 1831 in APE, in T3S R23W S6 SW1/4, N of Clip Mill.
1014	Picacho SW & Picacho	CA	1879	A trail—possibly equivalent to linear feature denoted by points assigned site #s CA-IMP-1673, CA-IMP-1674, & CA-IMP-1671. Portions in APE are located in Taylor Lake.
1883	Picacho SW	AZ	1920	A Parker to Yuma Road—small segment in APE W of Norton's Landing. Appears to pass through AZ R:14:17 (ASM) (which includes remnants of the Red Cloud Mill) which sits at the edge of the APE in an elevated location above the floodplain.
1854	Picacho SW	AZ	1881	A road—small segment located in APE, in Adobe Lake to SW of Norton's Landing.
1849	Picacho SW	AZ	1881	A road to Norton's Landing—linear feature on AZ side; passes in and out of APE. All segments in APE appear to be submerged.
1850	Picacho SW	AZ	1881	A hotel (Norton's Landing)—GLO point, plotted in Colorado River channel SW of Norton's Landing.
1851	Picacho SW	AZ	1881	Cabins (Norton's Landing)—GLO point, plotted in Colorado River channel SW of Norton's Landing.
1852	Picacho SW	AZ	1881	Unidentified structures; probably associated with Norton's Landing. Plotted on sand & gravel bar separating Adobe Lake from the Colorado River.
1848	Picacho	CA	1879	A trail—on W side of Colorado River, in a backwater W of Picacho. May be an extension of GLO Resource # 1849. Possibly equivalent to linear feature denoted by points assigned site #s CA-IMP-1690 & CA-IMP-1689.

Table 3.9-1. Cultural Features Shown on Government Land Office (GLO) Township Survey Plats that May be Located in the Implementation Agreement Area of Potential Effect[1]

Resource Number[2]	*7.5' USGS Quadrangle[3]*	*State*	*Plat Date*	*Resource Description*
1044	Picacho	CA	1879	A trail—passes in & out of APE. Possibly equivalent to linear feature denoted by points assigned site #s CA-IMP-1688, CA-IMP-1685, & CA-IMP-1682.
1082	Little Picacho Peak & Imperial Reservoir	CA	1883	A road—passes in & out of APE. W end submerged in Ferguson Lake. Possibly equivalent to linear feature denoted by points assigned site #s 4-IMP-3340 H, CA-IMP-3341, & CA-IMP-3342.
1083	Imperial Reservoir	CA	1883	A trail—passes in & out of APE. Possibly equivalent to linear feature denoted by point assigned site # 4-IMP-1707.
1699	Imperial Reservoir	AZ	1881	A Yuma & Prescott Road—passes in & out of APE on Arizona side of Colorado River.
1700	Imperial Reservoir	AZ	1881	A road to Castle Dome Mine—passes in & out of APE on Arizona side of Colorado River.
1701	Imperial Reservoir	AZ	1881	A road from Gila (unreadable) to Castle Dome—intersects the Yuma & Prescott Road, & the road to Castle Dome Mine in APE, SE of Castle Dome, in T5S R23W S30 SE1/4. Intersection appears to be submerged.
1698	Imperial Reservoir	AZ	1920	A road—small segment in APE in T14S R22 S13 NW1/4; submerged.
1697	Imperial Reservoir	AZ	1920	A road—S end of linear feature terminates in APE where it intersects the road from Yuma to Parker in T14S R22W S13.
1694	Imperial Reservoir	AZ	1920	A road from Yuma to Parker—passes in & out of APE. Most segments that appear to fall in APE are likely submerged.
1702	Imperial Reservoir	AZ	1881	A trail - short segment submerged in Martinez Lake.

1 Cultural features described in this table were identified from GLO township plat maps and surveyor notes (all of which were prepared prior to 1920), and transferred to contemporary 7.5' USGS quadrangles. Owing to the imprecise surveying methods in use at the time the township plats were prepared, and the differences in scale between the original township plat maps and the more recent 7.5' USGS quadrangle base on which the features were plotted, actual locations of the features described here may differ. With minor exceptions, none of the locations of the resources described here have been field verified. Information in this table was gathered solely for the purpose of determining the kinds of historic features that *might be present* within the Implementation Agreement APE.

2 "Resource number" refers to the identification number assigned to the feature, as found on the 7.5' USGS quadrangles and in tables and databases accompanying the LCR MSCP draft Class I inventory report (Clark et al., n.d.).

3 Information in table is organized according to 7.5' USGS Quadrangle moving from north to south along the Colorado River. No GLO cultural features were identified as potentially occurring within the Implementation Agreements APE on the following quadrangles: Cross Roads, La Paz Mtn., Mule Wash, and Red Hill SW.

Table 3.9-2. Cultural Resources Located Within or Adjacent to the Implementation Agreements Area of Potential Effect[1]

7.5' USGS Quadrangle	*Site Number(s)*[2]	*Site/Resource Description*
Gene Wash	**None assigned**	Parker Dam. **Contributing element to proposed Parker Dam Historic District. Potentially eligible for individual listing on the National Register.**
Parker	**CA-SBR-9853H**	Atchison Topeka and Santa Fe Railroad, Parker Cutoff. Crosses APE on bridge over Colorado River north of Parker, Arizona. Equivalent to GLO Resource #1182.
Parker	**CA-SBR-4371H**	Old Parker Road—touches W boundary of APE in SW part of USGS quad. 1994 update to site form indicates much of the road that was located on the floodplain has been destroyed by flooding, sedimentation, utility corridor access roads, & railroad construction/maintenance.
Big Maria Mtns. NE	**CA-RIV-783**	Ceramic & fire cracked rock scatter located on floodplain near Walter's Camp. Adjacent to APE; site plot touches APE boundary. Site form describes the resource as an ethnobotanical camp (screwbean).
Big Maria Mtns. NE	**CA-RIV-1109/ CA-RIV-419**	Site plot just edges into APE. Site consists of two intaglios considered to be part of the Quien Sabe site complex. The intaglios are noted as being on top of a mesa adjacent to the Colorado River, thus would fall outside the APE.
Big Maria Mtns. NE	CA-RIV-421	Site plot only; no data available. Site plot just edges into APEC. Site is most likely located on bluff above floodplain, placing it outside the APE.
Blythe	**AZ R:6:11 (ASM)/BLM 02-050-037**	Site is plotted on floodplain, just outside APE boundary. Site form does not describe site, but does indicate that it is a surface occurrence on an alluvial terrace in the mixed upland association, suggesting site has been misplotted.
Blythe	**AZ R:6:149 (ASM)**	Ehrenberg Bridge? No site form available.
Blythe	No info	Site plot in T3N R23E S15 NW1/4 near edge of APE. May denote historic structures associated with historic site of Ehrenberg. Most likely in elevated position above floodplain, placing it outside of APE.
Palo Verde	No info	Site plot in T9S R22E S7. Site plot only; no other information available. In APE between levee & main channel of Colorado River.
Picacho NW	**AZ R:14:16 (ASM)**	Historic mining/milling site. Numerous historic structures; badly vandalized. First recorded in 1979; avoidance recommended during 1990 inventory for mining project. In elevated location immediately adjacent to APE boundary. Possibly equivalent to GLO Resource # 1860.
Picacho NW	4-IMP-3264H/ CA-IMP-3264H	A crossroad bears north and south—Imperial County Information Center (IMP) GLO survey notes point plot.[3] Just outside APE on California side of Colorado River. From 1879 GLO survey notes by W. F. Benson.
Picacho NW	4-IMP-897	A cross trail bears north and south—IMP GLO point from 1879 GLO notes by W. F. Benson. On terrace immediately W of APE boundary. Possibly equivalent to GLO Resource # 1060.
Picacho NW	4-IMP-898	A cross trail bears north and south—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE. Possibly equivalent to GLO Resource # 1060.

Table 3.9-2. Cultural Resources Located Within or Adjacent to the Implementation Agreements Area of Potential Effect[1]

7.5' USGS Quadrangle	*Site Number(s)*[2]	*Site/Resource Description*
Picacho SW	**AZ R:14:17 (ASM)**	Historic mining/milling site. Includes Old Red Cloud Mill Site. On Arizona side of Adobe Lake. NE edge of site plot touches boundary of APE. Site is situated in elevated location overlooking the floodplain placing it beyond the APE.
Picacho SW	**CA-IMP-7092**	Cuckoo Mortars Site. Three bedrock mortar depressions on rocky point jutting into Taylor Lake. Site plotted on boundary of APE. Site description suggests it is in an elevated position near the lake, placing it outside the APE.
Picacho SW	4-IMP-1673/ CA-IMP-1673	A trail bears N15.W & S15.E—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Location plotted differently by two repositories, but probably reflect the same resource. Possibly equivalent to GLO Resource # 1014. On sand & gravel bar in APE.
Picacho SW	CA-IMP-1674	A cross trail bears N40.W & S40.E—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Possibly equivalent to GLO Resource # 1014. On sand & gravel bar in APE.
Picacho SW	CA-IMP-1672	A cross trail bears NE & SW—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Just outside of APE in elevated location at edge of Taylor Lake.
Picacho SW	No info	On California side of Colorado River. Site plot touches the boundary of the APE. Possibly an IMP GLO point.
Picacho	**4-IMP-5898H**	Historic structure located at the edge of small lake or slough. Natural cavern converted into a jail by addition of metal bars across entrance. 1987 site form indicates this is one of the last features associated with the old gold milling community of Picacho. At boundary of APE.
Picacho	**4-IMP-5871H**	A cleared circle & lithic scatter. Historic claim cairns. Aboriginal trail. Located on terrace above two minor washes; slough to NW. At edge of APE. Description of site location indicates it is on top of a bluff, placing it outside of the APE.
Picacho	**AZ-050-1643**	Rock art. Only map plot & photos available. On California side of Colorado River, on upper slope of bluff. Adjacent to, but outside boundary of APE.
Picacho	CA-IMP-1671/4-IMP-1671	A cross trail bears east & west—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE; submerged. Possibly equivalent to GLO Resource # 1014.
Picacho	4-IMP-3329H	A crossroad bears east & west—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE; wholly or partially submerged.
Picacho	4-IMP-3328H	A mining shaft bears south 66 [degrees]—IMP GLO point from 1879 GLO survey notes by W. F. Benson. On bluff adjacent to APE boundary.
Picacho	4-IMP-1690/CA-IMP-1690	A cross trail bears N.80E & S.80.W—IMP GLO point from 1879 GLO survey notes by W. F. Benson. On bluff adjacent to APE boundary. Possibly equivalent to GLO Resource # 1044.
Picacho	4-IMP-1689/CA-IMP-1689	A cross trail bears east & west—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Two plots from two repositories; probably reference the same resource. Possibly equivalent to GLO Resource # 1044.
Picacho	4-IMP-1688	A cross trail bears east & west—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Possibly equivalent to GLO Resource # 1042. On bluff, back away from APE boundary.

Table 3.9-2. Cultural Resources Located Within or Adjacent to the Implementation Agreements Area of Potential Effect[1]

7.5' USGS Quadrangle	*Site Number(s)[2]*	*Site/Resource Description*
Picacho	4-IMP-1685/CA-IMP-1685	A cross trail bears east & west—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Possibly equivalent to GLO Resource # 1042. On flood plain just outside boundary of APE
Picacho	4-IMP-1682/CA-IMP-1682	A cross trail bears north & south—IMP GLO point from 1879 GLO survey notes by W. F. Benson. Two plots received from two repositories, one in & one out of APE; probably represent the same resource. Possibly equivalent to GLO Resource # 1042.
Little Picacho Peak	4-IMP-3339H	A crossroad bears S.30E & N.30W—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE; submerged in Ferguson Lake.
Imperial Reservoir	**050-347**	Two cleared circles on terrace above Martinez Lake. Plotted at edge of APE. Locational description places it above & outside APE.
Imperial Reservoir	**X:3:13 (ASM)/AZ X:3:13 (ASM)**	Prehistoric habitation site. **Listed on National Register.** Located in elevated position on high point at edge of APE.
Imperial Reservoir	**none**	Imperial Dam. **Recommended to be a contributing element to All American Canal system.** Eligibility for individual listing unevaluated.
Imperial Reservoir	4-IMP-3340H/ CA-IMP-3340	A crossroad, course NW & SE—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. Good correspondence w/ GLO Resource # 1082. In APE at base of bluff at APE boundary.
Imperial Reservoir	4-IMP-3341H/ CA-IMP-3341	A crossroad, NW & SE—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. Two plots received from two repositories that probably relate to same point. One overlaps plot for 3342H. On sand & gravel bar in APE. Good correspondence w/ GLO Resource # 1082.
Imperial Reservoir	CA-IMP-3342/ CA-IMP-H	A crossroad, course north & south—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. Plot overlaps one received for CA-IMP-3341H. On sand & gravel bar in APE. Good correspondence w/ GLO Resource # 1082.
Imperial Reservoir	4-IMP-1707	A cross trail bears NW & SE—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. On bluff edge close to boundary of APE. Possibly equivalent to GLO Resource # 1083.
Imperial Reservoir	050-696	Site plot only; no site form available. Site plot touches APE boundary. Most likely in elevated location above APE.
Imperial Reservoir	CA-IMP-1709	A cross trail bears S.15E. & N .15W—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. Good correspondence w/W end of GLO Resource # 1084. In APE. Submerged?
Imperial Reservoir	CA-IMP-1710	A cross trail bears S.15E. & N.15W—IMP GLO point from 1881GLO survey notes by W. H. Myrick. Possibly equivalent to GLO Resource # 1084. In APE. Submerged?
Imperial Reservoir	CA-IMP-1708	A cross trail, course S.15E. & N.15W—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. Possibly equivalent to GLO Resource # 1084. In APE. Submerged?
Imperial Reservoir	4-IMP-3343H/CA-IMP-3343	A cross ditch course S.48E—IMP GLO point from 1881 GLO survey notes by W. H. Myrick. In APE. Wholly or partially submerged.
Imperial Reservoir	CA-IMP-1737	A cross trail on flat bears S.15E. & N.15W—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE. Submerged.

Table 3.9-2. Cultural Resources Located Within or Adjacent to the Implementation Agreements Area of Potential Effect[1]

7.5' USGS Quadrangle	*Site Number(s)[2]*	*Site/Resource Description*
Imperial Reservoir	CA-IMP-1711	A cross trail on flat bears S.15E. & N.15W—IMP GLO point from 1879 GLO survey notes by W. F. Benson. On boundary of APE. Wholly or partially submerged.
Imperial Reservoir	CA-IMP-3344H/ CA-IMP-3386	Same site. Official # is CA-IMP-3344H. A cross ditch 42.90 ft wide bearing S.5E—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE. Submerged.
Imperial Reservoir	CA-IMP-3382/ 4-IMP-3382H	A cross ditch, course S.30E—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE. Submerged.
Imperial Reservoir	CA-IMP-1732	A cross trail bears north & south—IMP GLO point from 1879 GLO survey notes by W. F. Benson. In APE. Submerged.
Imperial Reservoir	CA-IMP-3383/ 4-IMP-3383H	A cross ditch, course S.30W—IMP GLO point from 1879 GLO survey notes by W. F. Benson. On sand & gravel bar in APE.
Imperial Reservoir	2 site points w/ no #s	Both points are at edge of APE. Both appear to be located on bluff, placing them outside of the APE.
Imperial Reservoir	No info	Possibly an attempt to plot CA-IMP-3382, but plot is slightly off. In APE. Submerged.
Imperial Reservoir	No info	On line between T14S R22W S9 & S18. Probably an IMP GLO point. On sand & gravel bar in APE near CA-IMP-3341H and CA-IMP-3342H. Good correspondence to GLO Resource # 1082.
Imperial Reservoir	No info	Probably an IMP GLO point. Possibly a misplot of CA-IMP-1711 or CA-IMP-3344. In APE. Submerged.
Imperial Reservoir	No info	At edge of APE, on line between T14S R22W S7 & S18. Probably an IMP GLO point. Possibly equivalent to GLO Resource # 1083.

1 Information in table is organized according to 7.5' USGS Quadrangle moving from north to south along the Colorado River. No recorded sites were identified as being located within the Implementation Agreement APE on the following quadrangles: Crossroads, Parker SE, Parker SW, Poston, Big Maria Mtns. SE, La Paz Mtn., Blythe NE, Cibola, Mule Wash, and Red Hill SW.

2 Boldface denotes real sites, in contrast to those for which no information was available except a site plot, and Imperial County Information Center GLO points (see below).

3 Hereafter, IMP GLO point. These are points along township grid lines where GLO surveyors noted cultural features in their logs that intersected township grid lines, that have been assigned permanent state site numbers by Imperial County Information Center staff. Note that frequently these points reflect the intersection of a linear cultural feature, such as a trail or road, with the grid, and that there is some correspondence between these points and the linear GLO features identified in Table 3.9-1. Because IMP GLO point plots have officially been assigned site numbers, they are included in this table. However, there are no indications in Information Center records that any IMP GLO point sites have been visited to verify that a cultural resource is actually present at the location indicated on the site form or on the accompanying 7.5' USGS Quadrangle map. Given this, when assessing the effects to cultural resources resulting from a change in the point of delivery of Colorado River water included in the Implementation Agreement, IMP GLO point sites will be treated as GLO resources, not as sites.

Table 3.12-8. Excess Flows Below Morelos Dam for Select Years

	YEAR							
	2006		*2016*		*2026*		*2050*	
IA-IOP Scenario	*IA-IOP with 66 KAF Average IOP*	*IA-IOP with 331 KAF Max IOP*	*IA-IOP with 66 KAF Average IOP*	*IA-IOP with 331 KAF Max IOP*	*IA-IOP with 66 KAF Average IOP*	*IA-IOP with 331 KAF Max IOP*	*IA-IOP with 66 KAF Average IOP*	*IA-IOP with 331 KAF Max IOP*
Number of Simulated Traces	85	85	85	85	85	85	85	85
Occurrences of Observed Excess Flows Relative to No Action	0	0	+1	+1	0	0	0	0
Occurrences No Difference Relative to No Action	5	4	5	4	4	1	5	4
Occurrences of Observed Decreased Flows Relative to No Action	10	15	10	10	12	14	7	7
Range of Differences in Decreased Flows (KAF) Relative to No Action	35.8 to 67.3	17.4 to 505.9	35.7 to 194.4	142.2 to 852.7	0 to 102.8	0 to 456.0	0.3 to 137.4	201.2 to 460.0
Average of Differences in Decreased Flows (KAF) Relative to No Action	60.8	231.4	80.4	387.9	60.0	271.1	74.8	337.9
Occurrences of Observed Increase Flows Relative to No Action	5	1	2	3	2	3	1	2
Range of Differences in Increased Flows (KAF) Relative to No Action	4.4 to 214.9	534.7 to 534.7	156.9 to 194.4	150.5 to 280.1	10.9 to 52.6	178.1 to 747.6	32.7 to 32.7	43.1 to 1,069.2
Average of Differences in Increased Flows (KAF) Relative to No Action	110.0	534.7	175.7	209.7	31.8	487.8	32.7	556.1
Average Difference of Observed Excess Flow Relative to (KAF) No Action	-2.9	-146.8	-26.6	-191.1	-36.5	-129.5	-37.7	-96.4