# 3.1.4 Impacts and Mitigation Measures

This section provides a brief overview of how the impact assessment was conducted for the LCR, IID water service area and AAC, and Salton Sea subregions. In general, impacts to the hydrology and water quality of these areas were assessed using complex computer simulations. These modeling methods and their application are discussed below. Impacts to hydrology and water quality in the SDCWA subregion are not addressed because no impacts are anticipated in that subregion as described in the Methodology section below.

It should be noted that, even though there will be a "ramp-up" period between initiation of the water conservation and transfer measures, the impacts analysis discussion in the following sections describes the effects that implementation of the Proposed Project and Alternatives could have on water quality in IID drains and rivers at the transfer volume indicated in the impacts analysis.

## 3.1.4.1 Methodology

### LOWER COLORADO RIVER

#### *Water Quantity*

Flow in the Colorado River below Parker Dam can fluctuate on a seasonal, daily, and hourly basis. Baseline Colorado River System conditions and the conditions resulting from the action alternatives were simulated using Reclamation's Colorado River Simulation System (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 inflow trends. Future Colorado River 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.

#### *River Stage and Groundwater Elevation*

Very detailed river stage and groundwater elevation modeling was done for specific reaches under various flow regimes for the Biological Assessment for the Proposed Interim Surplus Guidelines (see Appendix D of the IA EIS [Reclamation 2002]). 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
- River Mile 49.2, Imperial Dam

Assuming reductions in flow in the Parker to Imperial river reach of 200 KAF, 300 KAF, 400 KAF, 500 KAF, 675 KAF, 948 KAF, 1,553 KAF, and 1,574 KAF, river elevations were calculated at these seven points. The river elevations were computed using the step-back water surface computations of the Corps of Engineers HEC-RAS computer program



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calibrated with cross-sectional survey data for 20 representative type areas distributed throughout the affected reach. In addition, water surface elevations were used to calculate the effect on groundwater levels in areas adjacent to, but not directly connected to, the river.

***Water Quality.*** Salinity has long been recognized as one of the major problems of the Colorado River. The assessment of potential Project-related impacts to surface water quality in the area affected by the change in the point of diversion is based on data provided by Reclamation's model for salinity. This impact analysis uses the same salinity model as is used to create salinity reduction targets for the Colorado River Basin Salinity Control Program. To do this, the model simulates the effects of scheduled water development projects to predict future salinity levels. These data are then used to compute the amount of new salinity control projects required to reduce the river's salinity to meet the standards at some point in the future. The model itself does not include future salinity controls because implementation schedules for future salinity control projects are not fixed and will vary considerably. The salinity control standards are purposefully designed to be long-term (nondegradation) goals, rather than exceedance standards used for industry or drinking water.

### IID WATER SERVICE AREA AND AAC

Impacts to water quality and hydrology resulting from the Proposed Project and Alternatives, including the No Project Alternative, were evaluated by using a predictive water quantity/quality computer model. To provide a common base of understanding for this EIR/EIS, this section of the report describes strategies for achieving conservation, a brief summary of the logic design and operation of the water quantity/quality model referred to as the Imperial Irrigation Decision Support System (IIDSS), and a definition of key terms.

***Key terms and strategies for achieving conservation***. The following provides a definition of the key terms that are used in this section.

- **A conservation program** is an accumulation of conservation projects that achieve a target conservation volume. This conservation volume will be measured by the reduction in the amount of water diverted at Imperial Dam by the AAC. For the transfer and QSA, the conservation program implementation and operation details will be determined by the IID Board of Directors and adjusted from time to time based on the needs of the participants.

- **Conservation projects** are categorized as either an on-farm irrigation system improvements or water delivery system improvements to achieve water conservation.

  - Participation in **on-farm irrigation system improvements** would be voluntary, and farmers would choose their own conservation measures. The farmers would also decide how much water to conserve, with a possible maximum annual amount per acre set by IID. In addition, the length of time a farmer participated in the program would likely vary; participants might move into and out of the conservation program. On-farm conservation would be measured by the reduction in a quantified amount at each farm turnout based on historical water deliveries from 1988 to 1995. Because future water use/needs for crop requirements and salt leaching of soils would not be expected to change unless Colorado River water salinity changed, conservation will be derived primarily from reduced tailwater runoff to the drains.

The exception to this would be land fallowing. Land fallowing may also be used to achieve on-farm conservation by reducing the overall demand for irrigation water in the Imperial Valley. Fallowing reduces both tailwater runoff and tilewater flows to the drains. In summary, the variables associated with defining an on-farm conservation program could be numerous, including spatial distribution, voluntary participation over given timeframes, the volume and efficiency of any conservation measure, and the total variability of irrigation demand and performance in space and time.

– **Water delivery system improvements** would also result in a reduction in drainage flow. At IID, system operational losses would be either canal seepage, canal operational spills, or water evaporation and transpiration. The system projects would be designed either to reduce or capture canal seepage or to capture canal operational spills. Projects to accomplish this could include canal lining, canal seepage collector systems, mid-lateral and operations reservoirs, and lateral interceptor systems. Conservation for these projects would be measured by the reduction of historical lateral spills, and the amount of seepage captured in a seepage collector.

***Modeled data.*** The following provides a brief explanation of the key concepts and methods used to establish the database, and the strategy for generating model output.

- **Baseline Hydrology and Water Quality** represents the physical conditions at the time of the NOI and NOP and reasonable anticipated future changes in these conditions. Hydrology and water quality are resources that change over time and cannot be properly represented at a point in time. Therefore, a 75-year Baseline was developed [see Appendix E (IIDSS Summary Report)] using the IIDSS based on 12 years (1987 to 1998) of available data representing river diversions, canal flows, farm turnout flows, climatic information, crops irrigated, drain flows and water quality. These data were adjusted based on reasonable anticipated future changes, such as an increase in Colorado River salinity, and for the effects of the IID / MWD 1988 water transfer. Finally, the data were projected to 75 years using a correlation based on 75 years of historical weather data compared to the 12-year data period. The Baseline includes an adjustment to limit the diversion of Priorities 1, 2, and 3 for normal year hydrology in the Colorado River to 3.85 MAFY.

- **Existing Setting vs. Baseline.** Important distinctions exist between the water quality data presented in Section 3.1.3, Existing Setting, and the Baseline water quality results provided in Section 3.1.4, Impacts and Mitigation Measures. For the most part, the Existing Setting section presents water quality data based on COC concentrations that were directly calculated by averaging the analytical results obtained from grab samples collected over a period of time at selected geographic locations within IID.

- **Salinity Concentrations.** Salinity concentrations in the Colorado River change over time and vary from month to month and year to year based primarily on hydrology and diversions and uses. As a result, the salinity concentration (771 mg / L TDS) used for the Existing Setting represents the concentration at the time of the NOP was developed by averaging analytical results from the 12-year period of record from 1987 to 1999. This average was derived from actual grab samples collected from imported Colorado River



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water and delivered to IID through the AAC. In contrast, the salinity concentrations used for the Baseline for impacts and mitigation measures of the Proposed Project and Alternatives was based on Reclamation's predictions that the salinity of the Colorado River at Imperial Dam would increase to a maximum average annual value of 879 mg/L. Thus, maximum TDS concentration values have been predicted over the life of the Proposed Project.

- **Pesticides and Herbicides**. The IID water quality database and modeling output included predicted concentrations of organochlorine insecticides (i.e., DDT and its metabolites DDE and DDD, and toxaphene), organophosphorus insecticides [diazinon and chlorpyrifos (Lorsban, Dursban)] and organochlorine herbicides (Dacthal) in water flowing through the IID drainage system. Furthermore, state and federal water quality standards are listed for some of these COCs (see significance criteria in Table 3.1-14a, page 3.1-84). However, quantitative data for these COCs are not provided in this EIR/EIS for the following reasons:

  – The small number of samples collected does not provide a database that adequately represents the water quality in the various geographic locations.

  – The water quality data are insufficient to determine if a regulatory standard has been exceeded (e.g., regulatory standards to determine acute and chronic concentrations require that samples be collected and results be conducted to determine 1-hour and/or 4-day average concentrations).

  However, the water quality discussion does provide qualitative assessments regarding predicted changes in pesticide and herbicide concentrations in IID surface waters and sediments. These predictions are based on the correlation between these parameters and the mobilization of TSS in IID's drainage water.

***Imperial Irrigation Decision Support System.*** The IIDSS is designed to predict annual water conservation volumes required by the IID/SDCWA Transfer Agreement and simulate the resulting changes in the quality and quantity of drainage water that flows in IID's drains and rivers. The IIDSS consists of three major components: the database, configuration manager, and the computer model MODSIM. These three components are linked to facilitate data organization, processing, and retrieval. Results obtained from the IIDSS are saved in files that can then be accessed for processing into the desired data evaluation method; for example, graphs, spreadsheets, or Geographic Information System (GIS) (Figure 3.1-25).

The IIDSS provides water quantity and quality output data by simulating the physical input and output processes that occur in delivering water to a farm, irrigating a crop, and predicting the resultant drainage outflow. In addition, the IIDSS can track multiple conservation projects (system and on-farm) and account for temporal changes and spatial movement of those conservation projects around IID (i.e., the model can simulate all flows and changes in the delivery system, as well as changes in on-farm flow paths).

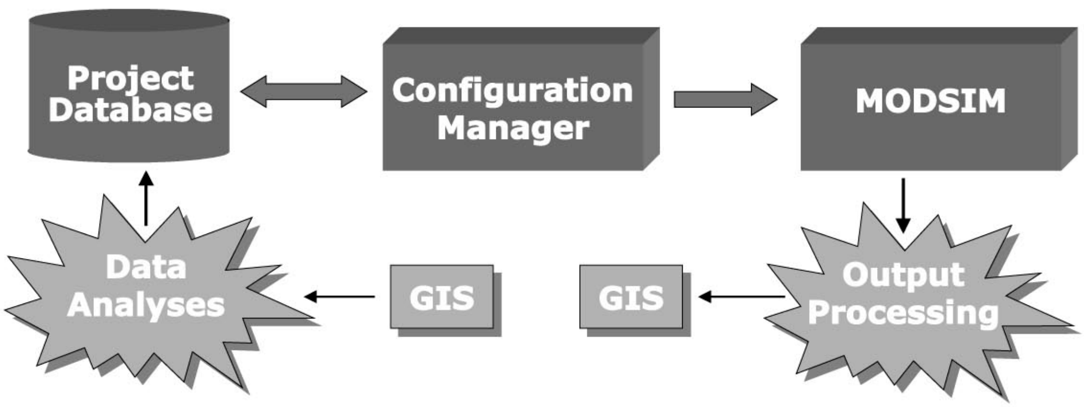


**Figure 3.1-25**
**Components of the Imperial Irrigation Decision Support System**



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For the on-farm conservation program, participating farms are randomly selected by delivery gates. Even though the IIDSS has the capability to select farms around the district, a sensitivity analysis determined that because of the large number of gates participating in each of the conservation alternatives, the random process of locating farms participating in the conservation program has a very minor impact on spatial changes in water quality in IID's drains.

To develop the Baseline from which to measure changes in water quality and hydrology in IID, a set of anticipated future conditions were input into the IIDSS database. This set of conditions represents the variability in flow and water quality that could be reasonably expected in the future. The Baseline conditions are based on the present state of irrigation within IID, but without implementation of any new water conservation measures. The establishment of the Baseline hydrology for IID was founded on 12 years of available irrigation delivery data, provided in monthly increments. This information, collected from 1987 through 1998, was available in sufficient detail to include delivery data at the farm gate level.

The 12-year delivery and diversion record used to drive the IIDSS also covers a period of time when the conservation measures established to support the MWD water transfer were being implemented. These measures include canal lining, construction of reservoirs and lateral interceptors, implementation of 12-hour deliveries, and installation of some on-farm irrigation system improvements.

Analysis of the 12-year period indicates that it has a similar mean and represents sufficient variability compared to a long historical record to allow the prediction of long-term variability in water supply, climatic conditions and farming practices in the IID water service area. The model results presented in this section are for both the 12-year and the 75-year time periods.

To establish the set of input values to represent the variability in flow and water quality that could be reasonably expected in the future, the following assumptions were used for the development of the modeled Baseline:

- Crop mix represented during the 12-year period is a reasonable representation of what is likely to be grown in the future.
- Climatic variability is a reasonable proxy for the variability in diversion and delivery from year –to year that is independent of farming practices.
- Water supply is limited to the water rights of IID, and consistent with the QSA. It should be noted, however, that the Proposed Project and Alternatives (based both on the IID / SDCWA Agreement and the QSA) include a consensual cap on IID's Priority 3 diversion of Colorado River water at 3.1 MAFY, subject to certain adjustments. In addition, under the conditions of the QSA, the IOP will be in effect, providing a payback provision that would be triggered when the annual diversion at Pilot Knob inadvertently exceeds IID's consensual cap.
- Changes in diversion and delivery as a result of conservation measures employed to-date is represented in the database.

To predict impacts to water quantity and quality from the implementation of a selected alternative, each model run begins by randomly selecting a delivery gate and computing the conservation achieved at that gate by comparison with historical (without conservation) deliveries to the gate. Subsequent gates are then randomly selected until the aggregate of the on-farm savings equals the alternative's on-farm conservation objective. System savings are modeled by introducing canal lining and lateral interceptor projects that achieve the targeted volume of system conservation. Total irrigation system demands are aggregated in an upstream fashion to determine total monthly demand in the AAC above the East Highline Canal turnout. In addition to farm deliveries at each headgate, the calculated total system demand would include all the irrigation system water losses, such as evaporation, seepage, and operational spills. The IIDSS intelligence would also account for conditions such as canal length and lining, size of canal, reservoir locations, and canal capacity.

In addition to the input and water system demand requirements, the IIDSS computes the "downstream" drainage volumes and downstream water quality in the IID surface drains and in the rivers that flow through the IID water service area. Like the delivery demand system, computation of drainage flows starts with the computation of on-farm water flows. Water delivered to the farm is used through evapotranspiration, with remaining waters leaching salt past the crop root zone (tilewater), or running off the end of the field (tailwater). These are primary contributors to the drains, both having a different water quality. In addition, the drains also intercept canal seepage flows, system operational spillage, and stormwater runoff. Thus, the New and Alamo River flows include the water from IID surface drains and other factors, such as flow in the New River across the International Boundary with Mexico, and the volume of water used by "wild" vegetation in the rivers.

To determine Baseline water quality conditions for IID, concentrations of water quality parameters (COCs) and flow were compiled for the modeling period from 1987 through 1998. These data were collected from locations throughout IID and were used to develop the water quality data set used to describe the modeling period. COC values at the mouths of the New and Alamo Rivers were used to calibrate the water quality functions contained in the model so that simulated values of mass loads and constituent concentrations matched observed values. For non-conservative constituents, decay functions were scripted into the model to simulate the impact of biological, chemical and physical activity on constituent concentrations. The IIDSS also used storage functions to compute the lag times associated with these constituents as they move through the delivery, farm, and drainage systems.

As previously noted, current salinity modeling efforts conducted by the Bureau of Reclamation predict that the average annual salinity levels at Imperial Dam would be maintained at 879 mg/L. This change represents an increase in salinity over the flow-weighted concentration values (using 771 mg/L as the TDS concentration in the Colorado River import water) that were compiled from the historical data set. Therefore, to remain consistent with Reclamation's values, the water quality data set was adjusted to compensate for the predicted increase in TDS in Colorado River import water.

Using the approach outlined above, the IIDSS predicted changes in water quantity and quality throughout IID for the Proposed Project and Project Alternatives, including the No Project Alternative. These predictions were used to assess the relative impacts among the Alternatives, and to examine the long-term effect of those impacts.



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***Model Output.*** The following discussion applies to model output for the Proposed Project and Project Alternatives.

- **COC Concentrations.** The predicted impacts to water quality in the IID water service area would be primarily related to changes in TDS, TSS, and selenium in the IID drainage water. In addition to being a direct result of implementation of the various Project Alternatives, these impacts are also related to Reclamation's predicted increase in the salinity of Colorado River delivery water from the existing concentration of 771 mg/L TDS to 879 mg/L TDS. This predicted change in the TDS concentration in Colorado River irrigation delivery water would be common to the Proposed Project and to Project Alternatives. In addition, the model used concentration values of 37 mg/L for TSS and 2.23 µg/L for selenium for irrigation delivery water in the AAC. These concentration values would be common to the Proposed Project and to Project Alternatives.

  The following sections include tables comparing the Baseline to the quantity and quality of water flowing into and out of the IID water service area for the Proposed Project and Alternatives. However, as previously noted in the Existing Setting section, this section does not include quantitative water quality values for the entire list of COCs. Rather, the tables contained herein only show those COCs (i.e., TDS, selenium, and TSS) that might exceed significance criteria that are based on state or federal water quality standards.

- **12-year and 75-year Model Runs.** As noted previously, the 12-year water data set was used to generate the 75-year water hydrology and water quality database. Review of the subsequent model output generated from this database indicates that the model results for the 12-year model runs would be substantially similar to the results generated by the 75-year runs. Therefore, only the 12-year model results are presented in the Impacts section.

### SALTON SEA

Assessment of the future of the Salton Sea with and without the Proposed Project and Alternatives is dependent on the ability to predict the hydrologic response of the Sea to changing conditions. Conservation programs would likely change inflows of both water and dissolved solids into the Sea. Predicting hydrologic response from these possible changes would require a computer model of the Salton Sea (described below).

**Salton Sea Accounting Model.** The Salton Sea Accounting Model was developed by Reclamation to predict hydrologic response to possible changes in the Sea (Weghorst 2001). It allows the effective evaluation of historical, present, and future conditions within the Sea. Specifically, the Salton Sea Accounting Model predicts changes in inflow, elevation, surface area, and salinity. Special operating requirements included the need to simulate:

- Future reductions in inflow
- Future changes in salt loads into the Sea
- Salt precipitation and/or biological reduction
- Imports of water
- Exports of water
- In-Sea ponds

The basics of the Salton Sea Accounting Model involve conservation of mass for both water and dissolved solids (salt). The Salton Sea Accounting Model maintains separate accounting of each, and corresponding calculations of salinity. The Salton Sea Accounting Model follows the following equations for mass calculations:

**Water in Storage = Previous Water in Storage + Inflow - Evaporation + Rain**
**Salt Content = Previous Salt Content + Salt Load – Precipitation (or Reduction)**

The Salton Sea Accounting Model can be run in two different modes. These are identified as stochastic and deterministic modes of operation. Both operate on an annual time step, which means that the model performs calculations once for each year. In stochastic mode, the model simulates a different sequence of hydrologic conditions each time the model is run. Running the model in this fashion takes into consideration that future hydrologic conditions at the Salton Sea are not likely to occur exactly in the same pattern that occurred historically. In the deterministic mode, the model assumes that historic hydrologic conditions will be repeated in the future in exactly the same pattern.

Salton Sea Accounting Model results presented in this report would be the result of stochastic simulations and include representations of "mean futures" for the Salton Sea. The term "mean future" is used to represent the averaging of results from one thousand Salton Sea Accounting Model simulations. Therefore, any point taken from one of the simulation charts presented would represent an average of hundreds of simulations. Graphs showing elevation, surface area, and salinity concentrations in the Sea have been presented using a 77-year timeframe. Documentation for the Salton Sea Accounting Model is provided in Appendix F.

***Salton Sea Accounting Model Output***. The following discussion applies to Salton Sea Accounting Model output for the Proposed Project and Project Alternatives.

- **COCs.** As noted above, the Salton Sea Accounting Model is able to predict salinity concentrations in the Sea over time. However, modeling methods for simulating future selenium concentrations in the Salton Sea are currently unavailable. Therefore, quantitative predictions regarding the impact(s) of selenium to water quality in the Sea are not discussed in this EIR/EIS. In addition, there are no specific water quality criteria for TSS in the Salton Sea. Therefore, an analysis of the impacts of TSS concentrations is not provided in this EIR/EIS. However, a qualitative analysis of the effects that TSS concentrations will have on sediment quality in the Salton Sea is provided below.

### IIDSS AND SALTON SEA ACCOUNTING MODELING RUNS FOR THE QSA AND SDCWA SERVICE AREA TRANSFERS

A number of modeling runs, using both the IIDSS and Reclamation's Salton Sea Accounting Model, were conducted to determine how the SDCWA and QSA water transfers would affect hydrology and water quality in IID drains and rivers and the Salton Sea. The model runs were conducted to simulate each transfer alternative's maximum impact to water quantity and quality in the IID and the Sea. Two model runs (i.e., 12-year and 75-year) from the IIDSS, and a 75-year stochastic analysis for the Salton Sea Accounting Model were required to simulate water quality and hydrology impacts associated with the various levels of water conservation (No Project, 130 KAFY, 230 KAFY, and 300 KAFY) included in the Proposed Project and Alternatives.

Table 3.1-13 includes a list of the IIDSS and Salton Sea Accounting Model runs that were conducted for each alternative. The model runs were conducted to simulate the maximum impacts from the Proposed Project and Project Alternatives to water quality and hydrology conditions in the IID and the Salton Sea. Therefore, the model runs assume that the QSA would not be implemented and all water would be transferred out of the basin. In this scenario, CVWD would not receive the up to 100 KAFY from IID or the additional 55 KAFY from other QSA projects.

**TABLE 3.1-13**
IIDSS and Salton Sea Modeling Runs for the QSA and SDCWA Service Area Transfers

| Proposed Project and Alternatives | Corresponding Model Runs | |
|---|---|---|
| | IIDSS | Salton Sea Model[1] |
| Proposed Project | Model Run 2: 12-year 200 On-farm and 100 WDS[2]<br>Model Run 3: 75-year 200 On-farm and 100 WDS | Total transfer of 300 KAFY to SDCWA/MWD (out of basin) via On-farm and WDS |
| Baseline | Model Run 1c: 12-year baseline<br>Model Run 1d : 75-year baseline | Baseline Conditions |
| Alternative 1: No Project | Model Run 1c: 12-year baseline<br>Model Run 1d: 75-year baseline | Baseline Conditions |
| Alternative 2: 130 KAFY | Model Run 10: 12-year 130 On-farm<br>Model Run 11: 75-year 130 On-farm | 130 KAFY to SDCWA/MWD via On-farm |
| Alternative 3: 230 KAFY | Model Run 13: 12-year130 On-Farm and 100 WDS<br>Model Run 14: 75-year130 On-Farm and 100 WDS | 230 KAFY to SDCWA/MWD via On-farm and WDS |
| Alternative 4: 300 KAFY[3] | Model Run 6: 12-year 300 Fallow<br>Model Run 12: 75-year 300 Fallow | Total transfer of 300 KAFY to SDCWA/MWD (out of basin) |

Notes:
[1] The Salton Sea Accounting Model runs only provide data for water surface elevation, surface area, and salinity.
[2] WDS – Water delivery system improvements.
[3] This alternative would require waiver of existing restrictions on fallowing included in the IID/SDCWA Water Transfer Agreement.

## SALTON SEA MODELING RUNS AND RETURN FLOW FROM THE CVWD SERVICE AREA

Under the first implementation scenario for the Proposed Project (IID/SDCWA Transfer Agreement Implementation Only) up to 300 KAFY would be transferred by IID to SDCWA. The IID/SDCWA Transfer Agreement makes no provision for the transfer of 100 KAFY to CVWD. In addition, there are no provisions in the IID/SDCWA Transfer Agreement for the 20 KAFY and 35 KAFY transfers to CVWD which are provided for in the QSA.

The Salton Sea Accounting Model runs used for analysis in this EIR/EIS assess a worst case scenario by assuming that CVWD would not receive the sources of water which are defined in the QSA and described below:

- 20 KAFY from MWD per the 1989 Approval Agreement
- 35 KAFY from MWD per the SWP Exchange Project
- Up to 100 KAFY from IID (the first 50 and second 50 KAFY)

Without the QSA CVWD will continue using groundwater including 155 KAFY required to meet demands unless other water sources are identified. Since these alternative water sources are currently unknown, and in order to assure that a worst- case scenario is evaluated in this EIR/EIS, the Baseline for the Salton Sea and the analysis of impacts for the Proposed Project and Alternatives assumes that CVWD will not receive water from the QSA projects or other sources which would result in return flows to the Salton Sea. Thus, only return flows from CVWD extracting and using 155 KAFY from its groundwater aquifers are included in the modeling to the Salton Sea. This is considered a worst-case scenario.

#### SUBREGIONS EXCLUDED FROM IMPACT ANALYSIS

The SDCWA/MWD Exchange Agreement specifies that the amount of water conserved by IID would be diverted at MWD's Whitsett Intake at Lake Havasu for delivery through the CRA to SDCWA. The conveyance and distribution of water from MWD's facilities to the SDCWA service area would not change as a result of implementing the Proposed Project. No new facilities, operations, or maintenance practices would be required in the SDCWA service area or by member utilities to receive or deliver the water transferred from IID. Therefore, no impacts in the SDCWA service area subregion are anticipated from the Proposed Project and SDCWA is not discussed in the impact analysis below.

### 3.1.4.2 Significance Criteria

The Proposed Project and/or Alternatives would have a significant impact on hydrology and water quality if they:

- Violate any water quality standards or waste discharge requirements (see the Water Quality Standards/Significance Criteria listed in Table 3.1-14a).
- Substantially deplete groundwater supplies or cause substantial interference with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).
- Substantially alter an existing drainage pattern of the site or area, including alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site.
- Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or a substantial increase in the rate or amount of surface runoff in a manner that would result in flooding on- or off-site.
- Create or contribute to runoff water exceeding the capacity of existing or planned stormwater drainage systems or provision of substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality, based on the designated beneficial uses and their corresponding water quality objectives (see Tables 3.1-14a and Table 3.1-14b).
- Cause inundation by seiche, tsunami, or mudflow.
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

**TABLE 3.1-14A**
Water Quality Standards/Significance Criteria

| Constituent of Concern | CMC[a] (mg/L) | CMC[a] (µg/L) | CCC[b] (µg/L) | Human Health[c] (µg/L) | TMDL[d] (mg/L) |
|---|---|---|---|---|---|
| TDS and Salinity | 4,000 | -- | -- | 250,000 | -- |
| Selenium | -- | -- | 5.0 | -- | -- |
| Boron | -- | -- | -- | -- | -- |
| TSS | -- | -- | -- | -- | 200 |
| Organophosphorus Insecticides | | | | | |
| – Chloropyrifos | | 0.083 | 0.041 | -- | -- |
| – Diazinon | -- | -- | -- | -- | -- |
| Organochlorine Insecticides | | | | | |
| – 4,4'-DDT | | 1.1 | 0.001 | 0.00059 | -- |
| – 4,4'-DDE | -- | -- | -- | 0.00059 | -- |
| – 4,4'-DDD | -- | -- | -- | 0.00083 | -- |
| – Toxaphene | -- | 0.73 | 0.0002 | -- | -- |
| Organochlorine Herbicides | -- | | -- | -- | -- |

Note: The values listed for the COCs in this table were derived from present and proposed regulations in the California Toxics Rule (ISWB/EBEP), and EPA National Recommended Water Quality Criteria. The criteria listed in this table are based on the most conservative value derived from a published final water quality rule for Aquatic Life Criteria. In cases where the value is not published in a final Aquatic Life Criteria water quality rule, the screening value for significance criteria was derived from Human Health Criteria for consumption of fish.

With the exception of selenium, the values in this table are for freshwater significance criteria only. Specific water quality standards for TDS, and TSS and selenium have not been established for the Salton Sea. However, the Colorado River Basin RWQCB Basin Plan establishes a goal for reducing salinity concentrations in the Sea from current levels to 35,000 mg/L. The Basin Plan states that "[w]hen salinity increases above 45,000 mg/L TDS, it is very questionable if a viable fishery will continue to exist in the Sea." However the Basin Plan also states that "the achievement of this water quality objective shall be accomplished without adversely affecting the primary purpose of the Sea, which is to receive and store agricultural drainage, seepage, and storm waters."

-- No appropriate or relevant requirement or criteria.

[a] Value derived from EPA Aquatic Life Criteria. Criterion maximum concentration (CMC) - a 1-hour average concentration designed to protect against unacceptable effects from acute (refers to short-term exposure to pollutants) exposures to higher concentrations.

[b] Value is derived from EPA Aquatic Life Criteria. Criterion continuous concentration (CCC) - a 4-day average concentration designed to protect against unacceptable effects from chronic (refers to long-term exposure to pollutants) exposures to lower concentrations.

[c] Value is derived from EPA Human Health Criteria. Based on the chemical's toxicity (noncancer or cancer) and exposure to that chemical from the consumption of fish. Exposure to the chemical of concern from air, drinking water (MCL) or from food other than fish is not included in the criterion.

[d] Value is derived from the Sediment/Siltation Total Maximum Daily Load for the Alamo River. The TMDL is an amendment to Colorado River Basin RWQCB Basin Plan (CRB RWQCB, 2001). The 200 mg/L TSS TMDL is established as a final (Phase 4) "Numeric Target" for Alamo River only. Interim numeric TMDL target goals and target dates for the Alamo River are as follows:

| Phase | Time Period | Interim Target |
|---|---|---|
| Phase 1 | 2001 - 2003 (Years 1 - 3) | 320 mg/L |
| Phase 2 | 2004 - 2007 (Years 4 - 7) | 240 mg/L |
| Phase 3 | 2008 - 2010 (Years 8 – 10) | 216 mg/L |
| Phase 4 | 2011 – 2013 (Years 11 - 13) | 200 mg/L |

Specific measures and Best Management Practices designed to achieve the Draft TMDL requirements stipulated by the RWQCB Basin Plan are included in the IID Revised Drain Water Quality Improvement Plan (DWQIP).



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- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

Designated beneficial uses and corresponding specific water quality objectives for subject waters are set forth in the CRWQCB (Colorado River Basin Regional Water Quality Control Board) Basin Plan and summarized in Table 3.1-14b. Federal regulations define water quality standards as including state's water quality objectives, designated beneficial uses, and anti-degradation policy. The anti-degradation policy requires that existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

In addition to the water body-specific objectives summarized in Table 3.1-14b, general water quality objectives are relevant to all surface receiving waters of the State. Regarding controllable sources of discharge, general water quality objectives that apply to all surface waters of the Colorado River Basin Region are briefly summarized as follows:

- **AESTHETIC QUALITIES -** All surface waters shall be free from substances attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to: settling to form objectionable deposits; floating as debris, scum, grease, oil, wax, or other matter that may cause nuisances; and producing objectionable color, odor, taste, or turbidity.
- **TAINTING SUBSTANCES -** Water shall be free of unnatural materials which individually or in combination produce undesirable flavors in the edible portions of aquatic organisms.
- **TOXICITY -** All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or indigenous aquatic life.
- **TEMPERATURE -** The natural receiving water temperature of surface waters shall not be altered by discharges of wastewater unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- **pH -** Since the regional waters are somewhat alkaline, pH shall range from 6.0-9.0. Discharges shall not cause any changes in pH detrimental to beneficial water uses.



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**TABLE 3.1-14B**
Beneficial Uses and WQOs for Potentially Affected Surface Waters

| Surface Waters | Beneficial Use | Water Quality Objectives |
|---|---|---|
| New River | Freshwater Replenishment<br>Industrial Service Supply (Potential)<br>Water Contact Recreation<br>Non-contact Water Recreation<br>Warm Freshwater Habitat<br>Wildlife Habitat<br>Preservation of Rare, Threatened, or Endangered Species | Free of untreated domestic and industrial waste waters<br>Free from toxic substances that may be discharged into the river as a result of human activity<br>BOD: 30 mg/L<br>COD: 70 mg/L (Lagoon Discharge Canal) and 100 mg/L (upstream of Discharge Canal)<br>Fecal Coliform: 30,000 colonies per 100 ml, with no single sample to exceed 60,000 colonies per 100 ml<br>Total Dissolved Solids (TDS): 4,000 mg/L (avg.) and 4,500 mg/L (max.)<br>Bacteria: geometric mean of E. coli densities less than 126 per 100 ml and enterococci less than 33 per 100 ml<br>Biostimulatory substances: Nitrate and phosphate limitations placed on industrial discharges considering beneficial uses |
| Alamo River | Freshwater Replenishment<br>Water Contact Recreation<br>Non-contact Water Recreation<br>Warm Freshwater Habitat<br>Wildlife Habitat<br>Hydropower Generation (Potential)<br>Preservation of Rare, Threatened, or Endangered Species | Total Dissolved Solids (TDS): 4,000 mg/L (avg.) and 4,500 mg/L (max.)<br>Bacteria: geometric mean of E. coli densities less than 126 per 100 ml and enterococci less than 33 per 100 ml<br>Biostimulatory substances: Nitrate and phosphate limitations placed on industrial discharges considering beneficial uses |
| Salton Sea | Aquaculture<br>Industrial Service Supply (Potential)<br>Water Contact Recreation<br>Non-contact Water Recreation<br>Warm Freshwater Habitat<br>Wildlife Habitat<br>Preservation of Rare, Threatened, or Endangered Species | Salinity: 35,000 mg/L unless demonstrated that a different level of salinity is optimal for sustenance of wild and aquatic life<br>Selenium: no more than four day average of 0.005 mg/L and one hour average of 0.02 mg/L<br>Bacteria: geometric mean of E coli densities less than 126 per 100 ml and enterococci less than 33 per 100 ml |

**TABLE 3.1-14B**
Beneficial Uses and WQOs for Potentially Affected Surface Waters

| Surface Waters | Beneficial Use | Water Quality Objectives |
|---|---|---|
| Lower Colorado River | Municipal and Domestic Supply<br>Agriculture Supply<br>Aquaculture<br>Industrial Service Supply<br>Ground Water Recharge<br>Water Contact Recreation<br>Non-contact Water Recreation<br>Warm Freshwater Habitat<br>Cold Freshwater Habitat<br>Wildlife Habitat<br>Hydropower Generation<br>Preservation of Rare, Threatened, or Endangered Species | Salinity: 723 mg/L (Below Hoover Dam), 747 mg/L (Below Parker Dam ), 879 mg/L (Imperial Dam ).<br>Bacteria: geometric mean of E. coli densities less than 235 per 100 ml and enterococci less than 1175 per 100 ml<br>Radioactivity: 5 pc/L (Combined Radium-226 and Radium-228), 15 pc/L (Gross Alpha particle activity, 20,000 pc/L (Tritium), 8 pc/L (Strontium-90), 50 pc/L (Gross Beta particle activity), 20 pc/L (Uranium)<br>Chemical Constituents: see note [1]<br>Fluoride: Refer to General Water Quality Objectives summarized below |
| Imperial Valley Drains | Freshwater Replenishment<br>Water Contact Recreation<br>Non-contact Water Recreation<br>Warm Freshwater Habitat<br>Wildlife Habitat<br>Preservation of Rare, Threatened, or Endangered Species | Herbicide spraying to be conducted in coordination with the County Agricultural Commissioner, California Department of Fish and Game (DFG), and California Department of Health Services<br>Total Dissolved Solids (TDS): 4,000 mg/L (avg.) and 4,500 mg/L (max.)<br>Bacteria: geometric mean of E. coli densities less than 126 per 100 ml and enterococci less than 33 per 100 ml<br>Biostimulatory substances: Nitrate and phosphate limitations will be placed on industrial discharges taking into consideration beneficial uses |

Note:

[1] Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the following limits: Maximum Contaminant Levels for Inorganic Chemicals (mg/L): Arsenic 0.05, Barium1.0, Cadmium 0.010, Chromium 0.05, Lead 0.05, Mercury 0.002, Nitrate 10.0, Selenium 0.01, Silver 0.05. Maximum Contaminant Levels for Organic Chemicals - Chlorinated Hydrocarbons (mg/L): Endrin 0.002, Lindane 0.004, Methoxychlor 0.1, Toxaphene 0.005. Chlorophenoxys: 2,4-D 0.1; 2,4,5-TP Silvex 0.01.

- **DISSOLVED OXYGEN -** The dissolved oxygen concentration shall not be reduced below the following minimum levels at any time: 5.0 mg/L in warm waters, 8.0 mg/L in cold waters, 8.0 mg/L in warm and cold waters.
- **SUSPENDED SOLIDS AND SETTLEABLE SOLIDS -** Discharges of wastes or wastewater shall not contain suspended or settleable solids in concentrations which increase the turbidity of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in turbidity does not adversely affect beneficial uses.
- **BIOSTIMULATORY SUBSTANCES -** Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
- **SEDIMENT -** The suspended sediment load and suspended sediment discharge rate to surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
- **TURBIDITY -** Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.
- **RADIOACTIVITY -** Radionuclides shall not be present in waters in concentrations which are deleterious to human, plant, animal or aquatic life or that result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal or aquatic life.
- **CHEMICAL CONSTITUENTS -** No individual chemical or combination of chemicals shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in hazardous chemical concentrations found in bottom sediments or aquatic life.
- **FLUORIDE –** Limiting concentrations of fluoride may vary with temperature. Refer to the CRWQCB Basin Plan for specific details.
- **PESTICIDE WASTES -** The discharge of pesticidal wastes from pesticide manufacturing processing or cleaning operations to any surface water is prohibited.

Some of these criteria and objectives are not considered explicitly in the water quality section but are discussed extensively in the evaluation of impacts on the resource that corresponds to the beneficial use (such as Biological Resources, Section 3.2, for warm water fisheries).

### 3.1.4.3 Proposed Project

#### LOWER COLORADO RIVER

#### *Water Conservation and Transfer*

The Proposed Project would include the diversion of up to 300 KAFY at Parker Dam to the Colorado River Aqueduct (CRA), and the transfer through the CRA of up to 200 KAFY to the SDCWA service area, with an optional transfer of up to 100 KAFY to SDCWA, CVWD, and/or MWD over the course of up to 75 years. The reduction in flow in the reach between

Parker and Imperial dams of up to 300 KAFY has the potential to result in beneficial and less than significant impacts on LCR water quality, as described below. The Proposed Project would not include construction or operation of new or improved facilities in the LCR; therefore, no impacts to hydrology and water quality resulting from changes in construction and operations would occur in the LCR.

There are no significance criteria that stipulate a specific federal or state standard for the actual quantity of water in the LCR. However, predicted (Reclamation's CRSS) changes in the quantity of water in the LCR will affect river surface elevations and are expected to potentially impact other resource areas such as groundwater, water quality, biology, air quality and recreation. The following discussion is presented to provide a better understanding of how the predicted reduction in the quantity of water in the LCR affects surface elevation and water quality. Discussions of potential secondary impacts on other resource areas are provided in the various resource sections.

**Water Quantity.** The proposed water transfers and exchanges between the California agricultural water agencies and MWD / SDCWA would change the point of diversion from Imperial Dam to Parker Dam, thus reducing flows and average river stage in the intervening river. The IOP adds a second "layer" of actions that could potentially change river flows. Inadvertent overruns would result in an increase in flows. This is because water is being released from Lake Mead to meet these inadvertent overruns. Conversely, during a payback, water orders would be lowered and less water would be released from Lake Mead.

Reclamation analyzed the effects of a 100 KAFY to 1,574 KAFY reduction in flow (including a flow reduction of 400 KAFY) from Parker Dam releases as part of the BA for the Interim Surplus Guidelines, Secretarial Implementation Agreements, Water Administration, and Conservation Measures on the Lower Colorado River - Lake Mead to the Southerly International Boundary (Reclamation 2000a). At both Headgate Rock Dam (between Parker and Palo Verde Diversion dams) and Palo Verde Diversion Dam, flows under higher flow conditions (90th percentile) under the IA and Baseline are extremely similar. For the 50th and 10th percentile values, flows under the IA and Baseline are also extremely similar, with flows slightly lower under the IA. This lower flow has two causes. Under the IA, California water use is less and therefore less water is released from Hoover Dam to the LCR; and, per IA transfer agreements, some of California's water is diverted at Parker Dam rather than left to flow in the river for diversion at Imperial Dam. Historically, in the period 1980 to 2000, average annual flow in this reach ranged from 20.5 MAF to 5.5 MAF, a variation of 14.5 KAFY. The potential change from combined IOP and IA affects is anticipated to be within the future normal fluctuation of the river.

### Impact WQ-1: Effects to groundwater, LCR flows, and LCR water quality.

The Colorado River is in hydraulic continuity with the groundwater in the underlying alluvium in the reach from Parker to Imperial Dams. 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. 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 to Parker Dam for 400 KAFY could lower the annual median river stage relative to Baseline by as much as 4.4 inches. The decline in median river stage could result in similar declines in groundwater levels, again as much as 4.4 inches, relative to the Baseline. Reduction in groundwater elevation would be greatest in non-irrigated areas and less severe in irrigated areas.

Relative to the Baseline, reduction of flow volume during a given season in the reach of the LCR between Parker and Imperial dams could beneficially impact sediment load in the LCR. The slower the flow rate, the lower the volume of suspended sediment. It is assumed that this general trend would also hold for the LCR between Parker and Imperial Dams; a lack of sufficient data, however, prevented the development of a relationship for this reach of the LCR. At lower flow rates, the water has less energy and thus picks up and transports less sediment. Reduced flow rate in the LCR could reduce sediment load and, therefore, provide a beneficial impact.

Under the Proposed Project, projected salinity is similar to that of the Baseline. Modeling of potential changes in salinity for the IA (which includes the water transfers under the Proposed Project) indicated that annual reductions in releases from Parker Dam could result in an increase in salinity concentration of up to 8 mg/L at Imperial Dam. This would be an approximately 1.5 percent increase in salinity at Imperial Dam and would be within the fluctuation observed from month to month. Below Hoover Dam and Parker Dam, projected salinity under the IA is no more than 1 mg/L higher than would be expected under Baseline.

Relative to Baseline, salinity concentrations are anticipated to continue to meet mandated objectives through salinity control projects; therefore, no impact to salinity in the LCR is anticipated. Relative to Baseline, no additional changes in water quality would be anticipated from the Proposed Project because no additional chemical constituents that could affect water quality conditions would be introduced to the reach by the Proposed Project. Impacts to water quality in the LCR are anticipated to be less than significant. (Less than significant impact.)

#### *Biological Conservation Measures in USFWS' Biological Opinion*

The potential effects 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, and Tier 2 conservation measures including restoration, revegetation, and maintenance of habitat are all planned along the LCR. 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 review. Anticipated impacts include reduced flow in the mainstem of the LCR, and water quality impacts during construction (Reclamation 2002).

*Impacts resulting from the implementation of the biological conservation measures in USFWS' Biological Opinion would be the same for Alternatives 2, 3, and 4; therefore, they are not discussed under each Alternative.*

### IID WATER SERVICE AREA AND AAC

#### *Water Conservation and Transfer*

This section describes the potential effects that implementation of the Proposed Project could have on water quantity and water quality in the IID water service area. IIDSS model results indicate that variations in water quantity and flow could potentially impact water and sediment quality in IID's drains and rivers. To illustrate this correlation, the impacts in this EIR/EIS include both water balance and water quality data for the Proposed Project and Alternatives. It should be noted that the IIDSS model results presented in this section do not reflect incorporation of the Salton Sea Habitat Conservation Strategy. The effect of the Salton Sea Habitat Conservation Strategy on drain water quality is described in this section below under "Salton Sea Habitat Conservation Strategy (HCP-SS) ."

There are no significance criteria that stipulate a specific federal or state standard for the quantity of water in the canals, drains, and rivers in the IID water service area. However, changes in quantity of water predicted by the IIDSS (Appendix E) have the potential to result in impacts to other resource areas, such as water quality and groundwater. The following discussion is presented to provide a better understanding of how the predicted reduction in water quantity potentially affects water quality and groundwater in the IID water service area.

IID Irrigation Water Delivered Through the AAC. The Proposed Project would reduce water delivery to IID through the AAC by up to 300 KAFY plus adjustments for the IOP. A flow diagram showing a water balance for IID under the Proposed Project is presented in Figure 3.1-26. The amount of water delivered (as measured at Mesa Lateral 5) would be reduced approximately 11 percent from the mean annual volume of 2.8 MAFY under the Baseline to approximately 2.5 MAFY. However, there would be little change in water levels in the AAC and main irrigation delivery canal system. Current water levels in the AAC, East Highline Canal, and Westside Main Canal are maintained as high as possible (i.e., within 0.1 ft of current levels) to maximize power generation from the hydropower facilities on these canals and to ensure efficient water delivery operations.

Collective Drains Discharging to the New and Alamo Rivers. Under the Proposed Project, the amount of drain (tile, tail, seepage, and spillage) water that is collected by and discharged from the IID drainage system to the New and Alamo Rivers would be reduced approximately 32.4 percent and 31.3 percent, respectively, from the mean annual volumes predicted for the Baseline. The primary impacts associated with the reduction of flow in the IID drains that discharge to the New and Alamo Rivers are associated with water quality in the drains. No other impacts to these drains are anticipated. Figure 3.1-27 shows the drainage basins within the IID water service area of the New and Alamo Rivers.

Alamo River. The amount of water discharged from the Alamo River to the Salton Sea would be reduced by approximately 30 percent from a mean annual volume of 576 KAFY predicted under the Baseline, to approximately 401 KAFY. As previously noted, the volume of water within the Alamo River would mainly consist of IID drainage. The primary impacts resulting from the reduction of flow in the Alamo River are related to water quality in the river, and impacts to water quality and quantity in the Salton Sea. No other impacts associated with the decreased flow in the river are anticipated.



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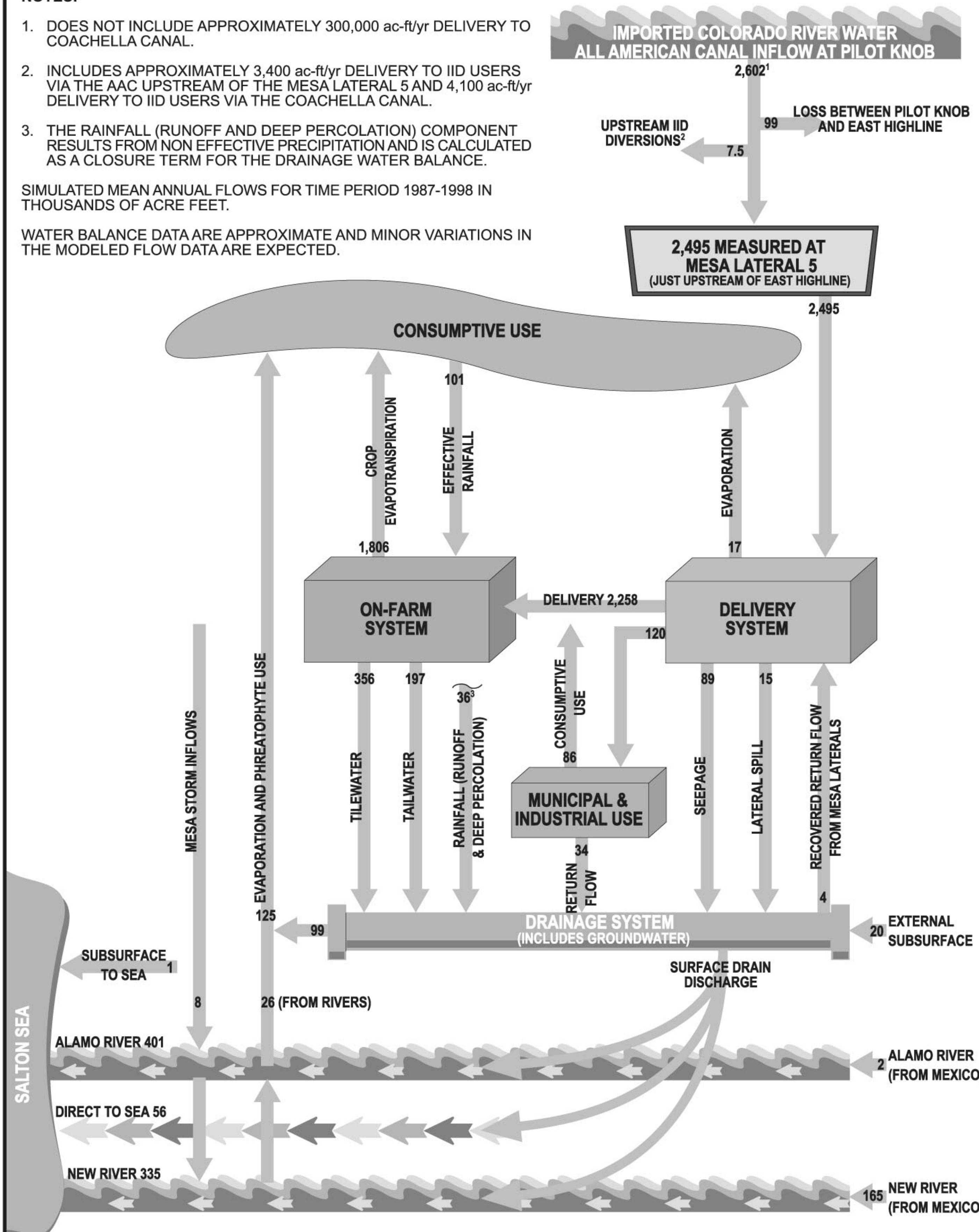
NOTES:

1. DOES NOT INCLUDE APPROXIMATELY 300,000 ac-ft/yr DELIVERY TO COACHELLA CANAL.
2. INCLUDES APPROXIMATELY 3,400 ac-ft/yr DELIVERY TO IID USERS VIA THE AAC UPSTREAM OF THE MESA LATERAL 5 AND 4,100 ac-ft/yr DELIVERY TO IID USERS VIA THE COACHELLA CANAL.
3. THE RAINFALL (RUNOFF AND DEEP PERCOLATION) COMPONENT RESULTS FROM NON EFFECTIVE PRECIPITATION AND IS CALCULATED AS A CLOSURE TERM FOR THE DRAINAGE WATER BALANCE.

SIMULATED MEAN ANNUAL FLOWS FOR TIME PERIOD 1987-1998 IN THOUSANDS OF ACRE FEET.

WATER BALANCE DATA ARE APPROXIMATE AND MINOR VARIATIONS IN THE MODELED FLOW DATA ARE EXPECTED.




The data in this figure does not reflect implementation of the Salton Sea Habitat Conservation Strategy

**Figure 3.1-26**
**Proposed Project**
**Average Overall Water Balance**
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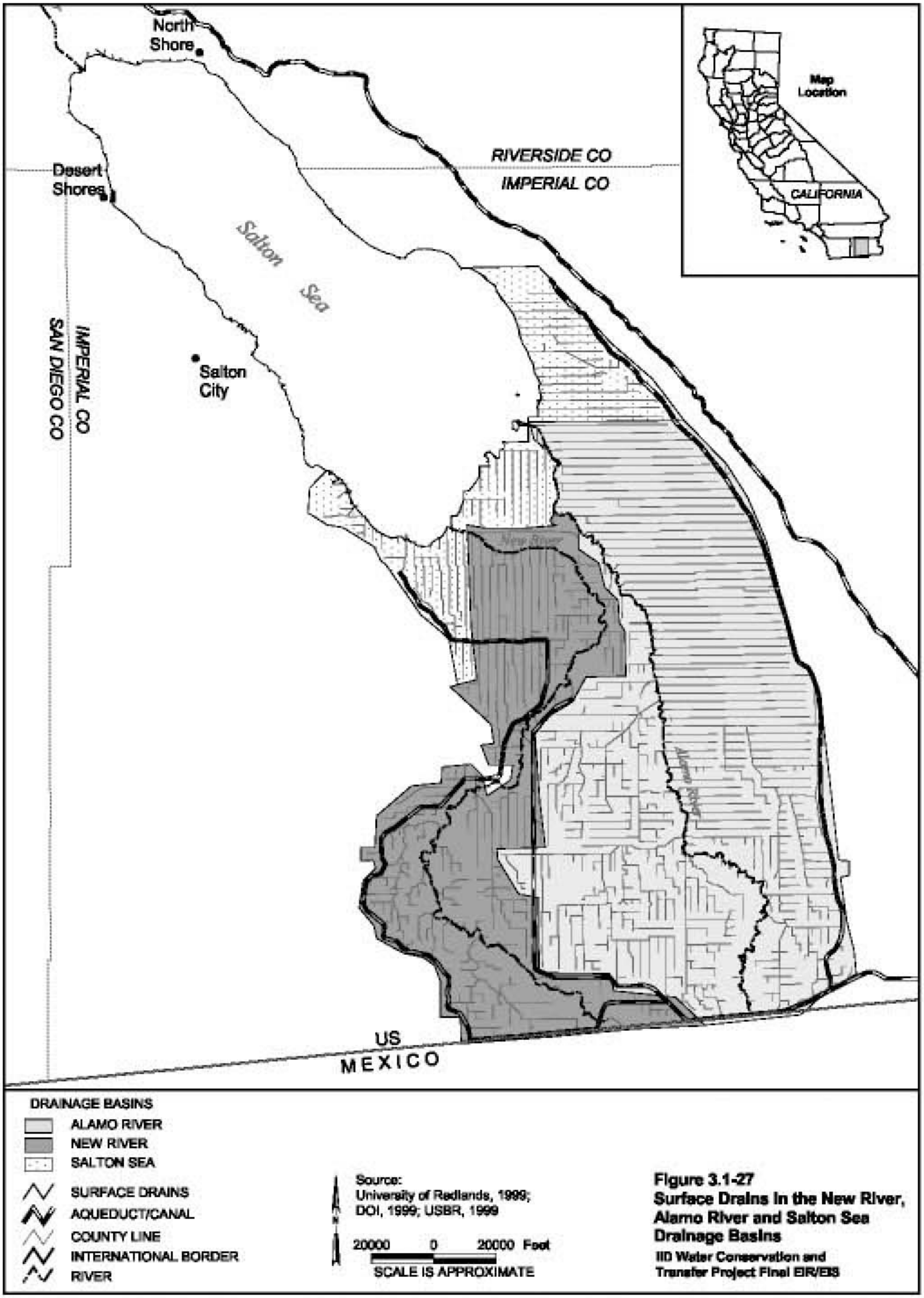


**Figure 3.1-27**
**Surface Drains in the New River, Alamo River and Salton Sea Drainage Basins**
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New River. The average annual flow volume of the New River at the International Boundary is estimated at approximately 165 KAFY. This flow volume may be affected by water demand and discharges in Mexico, and has changed dramatically over the period of record. Future changes in flow volume across the International Boundary could occur; however, this flow would not be affected under the Proposed Project. Model results for IID drainage indicate that when combined with the current flow from Mexico, the mean annual flow in the New River at the outlet to the Salton Sea would be approximately 335 KAFY. This represents a reduction of approximately 22 percent from the predicted flow of 431 KAFY under the Baseline. The primary impacts related to the reduction of flow in the New River are associated with water quality in the river, and impacts to water quality and quantity in the Salton Sea. No other impacts associated with the decreased flow in the river are anticipated.

Surface Drain Discharge Directly to the Salton Sea. Similar to the reductions to New and Alamo Rivers, implementation of the Proposed Project would reduce the amount of water discharged directly from IID drains to the Salton Sea by approximately 39 percent from 92 KAFY, predicted under the Baseline, to approximately 56 KAFY. The primary impacts from the reduction of flow in the surface drains are related to water quality in the drains and impacts to water quality and quantity in the Salton Sea.

Water Quality of New River at the International Boundary. Under the Proposed Project, the average concentrations of TDS and selenium in the New River at the International Boundary are

below their respective significance criteria. The average monthly concentration values of input data used to characterize flow at the International Boundary have an average TDS concentration of 2,719 mg/L and a selenium concentration of 2.3 µg/L. The TSS concentration at this location is 50 mg/L.

Although flow from Mexico ultimately contributes to the mass load that is discharged to the Salton Sea, the concentrations of these COCs in the flow from Mexico is not affected by the Proposed Project or Alternatives described in this EIR/EIS (see Table 3.1-16 on page 3.1-97). Therefore, no impact from the Proposed Project on water quality is expected in the New River at the International Boundary.

### *Surface Water Quality*

**Note:** All water quality values presented under the Proposed Project were derived using the IIDSS model with the assumption that on-farm and/or water delivery system based measures would be implemented to conserve water for transfer. Water quality results assuming fallowing is used to generate water for transfer are presented under Alternative 4.

**Impact WQ-2: Increased selenium concentration in IID surface drain discharges to the Alamo River.** Model results indicate that the average TDS, TSS, and selenium concentrations in the collective surface drain discharge to the Alamo River are 3,645 mg/L, 194 mg/L, and 9.25 µg/L, respectively. Both TDS and selenium concentrations are above the Baseline concentrations for these COCs while the concentration of TSS is lower than the Baseline. The predicted TDS and TSS concentrations are below their respective significance criteria of 4,000 mg/L and 200 mg/L. At 9.25 µg/L, the predicted selenium concentration is above its significance criterion of 5.0 µg/L. However, it should be noted that the Baseline selenium concentration (6.32 µg/L) is also over the significance criterion (see Table 3.1-15).

| | ALAMO RIVER DRAINAGE BASIN | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Proposed Project | | Alternative 1/ Baseline | | Alternative 2 | | Alternative 3 | | Alternative 4 | |
| | *Surface Drains* | *Outlet to Salton Sea* | *Surface Drains* | *Outlet to Salton Sea* | *Surface Drains* | *Outlet to Salton Sea* | *Surface Drains* | *Outlet to Salton Sea* | *Surface Drains* | *Outlet to Salton Sea* |
| TDS (mg/L) | 3,645 | 3,101 | 2,492 | 2,465 | 2,723 | 2,676 | 3,501 | 2,917 | 2,403 | 2,418 |
| TSS (mg/L) | 194 | 209 | 252 | 264 | 211 | 222 | 225 | 242 | 247 | 259 |
| Se (µg/L) | 9.25 | 7.86 | 6.32 | 6.25 | 6.91 | 6.25 | 8.88 | 7.39 | 6.10 | 6.13 |

| Water Quality Criteria |
|---|
| TDS......4,000 mg/L |
| TSS......200 mg/L |
| Se...........5 µg/L |

Notes:

All water quality data in the Project Alternatives are flow weighted based on 12-year model runs.

The data in this table does not reflect implementation of the Salton Sea Habitat Conservation Strategy.

**Table 3.1-15**
**Comparison of Average Annual COC Concentrations for the Alamo River Drainage Basin for the Proposed Project and Alternatives**
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Model results indicate that, over time, average selenium concentrations in the surface drains that discharge to the Alamo River would remain above the water quality standard of 5.0 µg/L (see Table 3.1-14A). As discussed in the Existing Setting section (Section 3.1.3), selenium and salts that are carried into IID from imported Colorado River irrigation water tend to build up in soils and root zones as crops are irrigated. Periodically, farmers leach their fields, and the excess salts and selenium dissolve out of the root zone and discharge into the tilewater system. Ultimately, concentrations of dissolved salt and selenium form in the water that is discharged into the IID surface drains. As a result, selenium would exceed its water quality criteria at the surface drain discharge to the Alamo River. This impact cannot be mitigated and is considered significant and unavoidable. (Significant and unavoidable impact.)

**Mitigation WQ-2:** No reasonable mitigation is available to reduce the concentration of selenium in the drains. The HCP IID Water Service Area Portion includes habitat replacement to mitigate the biological impacts resulting from the increased selenium; however, the selenium concentration itself would not be reduced by the HCP. (Significant and unavoidable impact.)

**Impact WQ-3: Reduction in Total Suspended Solids concentration in IID surface drains discharging to the Alamo River.** As noted above and shown in Table 3-1-15, the predicted average annual TSS concentrations for the Proposed Project are lower than the concentrations modeled under the Baseline. The lower TSS concentrations are expected to reduce the sediment load that would discharge to the Alamo River, resulting in a beneficial impact to river water quality. (Beneficial impact.)

**Impact WQ-4: Increase in selenium concentration in Alamo River at the Outlet to the Salton Sea.** With the Proposed Project, model results indicate that the average annual concentration of TDS in the Alamo River at the outlet to the Salton Sea would be 3,101 mg/L, which is below the significance criterion of 4,000 mg/L. However, the modeled selenium concentration is 7.86 µg/L, which is above the significance criteria of 5.0 µg/L.

The TDS and selenium concentrations for the Proposed Project are higher than the levels shown under the Baseline (see Table 3.1-15). However, the TSS concentration under the Proposed Project is lower than the levels predicted under the Baseline.

The impacts of elevated selenium levels in the Alamo River are similar to those described under WQ-1 above; that is, they exceed water quality criteria and could not be mitigated, and they are considered significant and unavoidable. (Significant and unavoidable impact.)

**Mitigation WQ-4**: None available. (Significant and unavoidable impact.)

**Impact WQ-5: Increase in selenium concentration in the IID surface drain discharge to the New River.** Under the Proposed Project, the average concentration of TDS, 3,294 mg/L, in the collective surface drain discharge to the New River is below the significance criterion. However, model results indicate that average selenium concentration, 8.30 µg/L, in the IID surface drains to the New River is above the significance criterion. The average concentration of TSS in the New River is 232 mg/L (see Table 3.1-16).

| | NEW RIVER DRAINAGE BASIN | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Proposed Project | | | Alternative 1/ Baseline | | | Alternative 2 | | | Alternative 3 | | | Alternative 4 | | |
| | *Mexico Border* | *Surface Drains* | *Outlet Salton Sea* | *Mexico Border* | *Surface Drains* | *Outlet Salton Sea* | *Mexico Border* | *Surface Drains* | *Outlet Salton Sea* | *Mexico Border* | *Surface Drains* | *Outlet Salton Sea* | *Mexico Border* | *Surface Drains* | *Outlet Salton Sea* |
| TDS (mg/L) | 2,719 | 3,294 | 3,075 | 2,719 | 2,485 | 2,617 | 2,719 | 2,839 | 2,824 | 2,719 | 3,134 | 2,929 | 2,719 | 2,585 | 2,606 |
| TSS (mg/L) | 50 | 232 | 175 | 50 | 294 | 238 | 50 | 257 | 199 | 50 | 264 | 207 | 50 | 285 | 229 |
| Se (μg/L) | 2.25 | 8.30 | 3.77 | 2.25 | 6.51 | 3.30 | 2.25 | 7.15 | 3.50 | 2.25 | 7.90 | 3.62 | 2.25 | 6.50 | 3.18 |

**Water Quality Criteria**

TDS......4,000 mg/L

TSS......None applicable

Se..........5 μg/L

**Notes:**

All water quality data in the Project Alternatives are flow weighted based on 12-year model runs.

The data in this table does not reflect implementation of the Salton Sea Habitat Conservation Strategy.

**Table 3.1-16**
**Comparison of Average Annual COC Concentrations for the New River Drainage Basin for the Proposed Project and Alternatives**
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In comparison to Baseline concentrations, both TDS and selenium concentrations are greater under the Proposed Project. However, TSS concentrations are lower under the Proposed Project than the concentrations modeled under the Baseline.

Impacts of selenium concentrations in the IID surface drains that discharge to the New River are significant and unavoidable. (Significant and unavoidable impact.)

**Mitigation WQ-5**: See mitigation WQ-2. (Significant and unavoidable impact.)

**Impact WQ-6: Change in COC concentration in the New River at the Outlet to the Salton Sea.** The average concentrations of TDS (3,075 mg/L) and selenium (3.77 µg/L) in the New River at the outlet to the Salton Sea are below their respective significance criteria see Table 3.1-16). In comparison to Baseline concentrations, modeled concentrations of TDS and selenium under the Proposed Project are higher , while TSS concentrations are lower. Because TDS and selenium are predicted to remain below their water quality significance criteria, the changes in the concentrations of these COCs are considered less than significant impacts. (Less than significant impact.)

**Impact WQ-7: Increase in selenium concentration in the IID surface drains discharging directly to the Salton Sea.** Model results indicate that, under the Proposed Project, the average concentrations of TDS and TSS in IID drains that discharge directly to the Salton Sea are 2,637 mg/L and 132 mg/L, respectively. However, the average selenium concentration at this location is 6.7 µg/L, which is above the significance criterion (see Table 3.1-17). In comparison to the Baseline, TSS concentrations are lower under the Proposed Project, but both selenium and TDS concentrations are increased.

Impacts from selenium concentrations in surface drain discharge to the Salton Sea are significant and unavoidable. (Significant and unavoidable impact.)

**Mitigation WQ-7**: See mitigation WQ-2. (Significant and unavoidable impact.)

**Impact WQ-8: Potential effects to Imperial Valley groundwater hydrology.** The groundwater storage capacity of the Imperial Basin is estimated to range from approximately 7 MAF (County of Imperial 1977) to 14 MAF (DWR 1975). Therefore, conservation along with reduction in surface water deliveries by 300 KAFY are expected to have a minimal effect on the volume of groundwater stored in the basin. In addition, the beneficial use of groundwater in IID is limited, and few wells are used for groundwater production (none for irrigation) because yield is low and the water is of poor quality; TDS concentrations range from a few hundred to more than 10,000 mg/L (Montgomery Watson 1995). Therefore, impacts from the Proposed Project on groundwater quality and beneficial use in the IID water service area are expected to be less than significant. (Less than significant impact.)

### Inadvertent Overrun and Payback Policy

Conservation of 59 KAFY for the IOP can be accomplished through fallowing or other conservation measures. This conservation would be in addition to the up to 300 KAFY for the Proposed Project, and is now part of the Proposed Project. If fallowing is selected, about 9,800 additional acres would be required.

| | SALTON SEA DRAINAGE BASIN [1] | | | | |
|---|---|---|---|---|---|
| | Proposed Project | Alternative 1/ Baseline | Alternative 2 | Alternative 3 | Alternative 4 |
| TDS (mg/L) | 2,637 | 1,892 | 2,004 | 2,525 | 1,815 |
| TSS (mg/L) | 132 | 136 | 121 | 148 | 136 |
| Se (µg/L) | 6.69 | 4.80 | 5.09 | 6.40 | 4.61 |

| Water Quality Criteria |
|---|
| TDS......4,000 mg/L |
| TSS......None applicable |
| Se...........5 µg/L |

Notes:

All water quality data in the Project Alternatives are flow weighted based on 12-year model runs.

The data in this table does not reflect implementation of the Salton Sea Habitat Conservation Strategy.

[1] Drains that discharge directly to the Salton Sea.

**Table 3.1-17**
**Comparison of Average Annual COC Concentrations for IID Drains Discharging to the Salton Sea for the Proposed Project and Alternatives**
**IID Water Conservation and Transfer Project Final EIR/EIS**

Hydrologic impacts of the IOP have been modeled to reflect the worst case average condition over the period of the project. This assumption resulted in an average annual payback to the river of 59 KAFY. Comparing this average payback to the entitlement curtailment of approximately 59 KAF to the agriculture entitlements included in the Baseline resulted in no changes to flows in the Colorado River as a result of the IOP. The effect of the IOP compared to entitlement curtailment as a result of river administration result in a change of the payback shifting from CVWD to IID.

*Impacts resulting from the implementation of the IOP would be the same for Alternatives 2, 3, and 4 and, therefore, are not discussed under each Alternative.*

#### *Habitat Conservation Plan (HCP-IID) (IID Water Service Area Portion)*

**Impact HCP-IID-WQ-9: Wetland creation element of HCP provides additional high value water resource area.** The HCP includes the construction of new marsh in the IID water service area. This water would come from either the irrigation delivery water canal system or drain system and could be diverted through existing drains. The diversion of water through the drains could help dilute COC concentrations in those surface drains that are used to support the creation of additional marsh. As a result, the HCP is expected to have a beneficial impact to water quality in IID drains that are used to support the HCP. (Beneficial impact.)

*Impacts to hydrology and water quality resulting from implementation of the IID Portion of the HCP would be the same under Alternatives 2, 3 and 4 and therefore are not discussed under each Alternative.*

#### *Salton Sea Habitat Conservation Strategy (HCP-SS)*

Under the Salton Sea Portion of the HCP, mitigation water would be supplied to the Sea to maintain the salinity of the Sea below 60 ppt until 2030. As described in Section 2.2.6.7, the Salton Sea Habitat Conservation Strategy has been evaluated in this Final EIR/EIS with the assumption that mitigation water would be generated by fallowing within the IID water service area. Other sources of water could be used, but they have not been evaluated in this EIR/EIS.

Additionally, under the Proposed Project, the implementation of the Salton Sea Habitat Conservation Strategy in concert with the on-farm irrigation system improvement approach to conserving water for transfer was determined not to be feasible due to the number of total acres that would be needed. This is because the "efficiency conservation" measures require a 1 to 1 ratio of mitigation water to the Sea. Therefore, the combination of only on-farm and/or delivery system efficiency conservation measures required to produce 300 KAFY for transfer plus fallowing within the IID water service area as the sole method of providing the mitigation water associated with the Salton Sea Habitat Conservation Strategy has not been assessed in this Final EIR/EIS.

Implementation of the Salton Sea Habitat Conservation Strategy could affect water quality in the drains depending on the source of the water used to provide mitigation water. If fallowing within the IID water service area is used to generate mitigation water, minor changes in water quality could occur. However, it is expected that fallowing to generate mitigation water would not change the tail and tile water percentages in the drains and, as a result, water quality would not change appreciably. This expectation was verified by making additional runs with the IIDSS model.

If fallowing within the IID water service area is used to provide mitigation water under the Salton Sea Habitat Conservation Strategy, minor changes to water quality concentrations could occur in the New River because about one-third of the flow comes from Mexico and fallowing would reduce constituent mass loading. In addition, because of smaller flows in the canal system that would occur, there could be minor water quality changes in the canals and rivers because of changes in seepage losses and gains.

## SALTON SEA

### *Water Conservation and Transfer*

**Water Quantity.** There are no significance criteria that stipulate a specific federal or state standard for the elevation, area, and quantity of water in the Salton Sea. However, changes in elevation and surface area, predicted by Reclamation's Salton Sea Accounting Model (Reclamation 2001b) may have potential impacts to other resource areas, such as water quality, air quality, aesthetics and recreation. The following discussion is presented to provide a better understanding of how the predicted reduction in the elevation and surface area of the Sea affects water quality and other resource areas.

According to model results generated by the IIDSS (see Appendix E), the Proposed Project is expected to reduce IID's discharge to the Salton Sea by approximately 28 percent, from roughly 1.1 MAFY under the Baseline, to 793 KAFY (includes flow from Mexico). Over a 75-year period, modeling conducted by Reclamation indicates that the reduction in flow is expected to result in a drop in the surface level of the Sea of roughly 22 feet, from its Baseline elevation of approximately –228 feet msl to –250 feet msl (Salton Sea Accounting Model 2001 data, see Figure 3.1-28). In addition, Reclamation's model predicts that over the life of the Proposed Project, the reduction of flow will reduce the surface area of the Sea by 28 percent (approximately 103 square miles), from the present area of approximately 233,000 acres to 167,000 acres. By far, the greatest reductions are expected to occur between the time of the initiation of transfer and the year 2030, when the Sea is expected to drop to a mean elevation of –245 feet msl (see Figure 3.1-28). In comparison, under the Baseline, the mean elevation of the Sea is expected to drop approximately 7 feet to –235 feet msl over the same 75-year period. However, with implementation of the Salton Sea Habitat Conservation strategy in concert with the Proposed Project, the elevation of the Sea will be maintained at or above Baseline elevations to the year 2035 and then reach an elevation of about –240 feet msl at the end of the project term, 2077.

This change in elevation and area, in-turn, would result in the exposure of additional shoreline along the perimeter of the Sea, thus, potentially impacting other resources such as air quality, aesthetics, and recreation. Further analysis of impacts associated with the reduction of surface area and elevation of the Sea and the increased exposure of shoreline is included in Sections 3.6—Recreation, 3.7—Air Quality, and 3.11—Aesthetics.

It is also important to note that the Salton Sea Restoration Project is evaluating actions to stabilize the elevation and reduce the salinity of the Salton Sea (see Section 1.6.2 in Section 1). Therefore, it is possible that changes to water quantity and elevation of the Sea could be improved if feasible restoration alternatives are identified and implemented. Additionally, the HCP (Salton Sea Portion) would reduce water quantity impacts to the Sea (see discussion of HCP [Salton Sea Portion], below).



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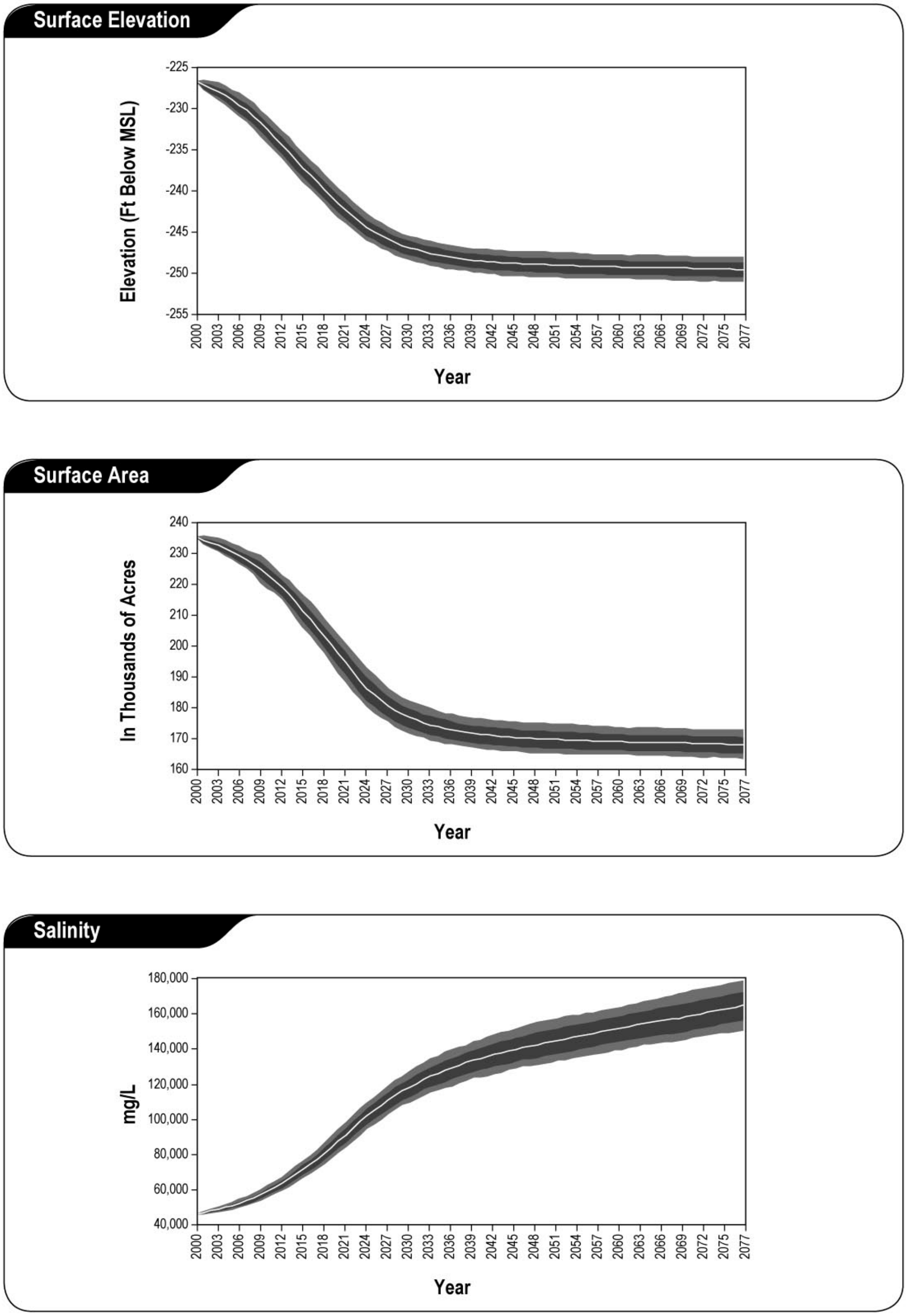


**Legend:**

- Mean
- +1 Standard Deviation, -1 Standard Deviation
- +95 Percentile, -5 Percentile

**Notes:**

Mean: Mean of all traces

95 Percentile: 95 percent of all model traces resulted in values less than or equal to the indicated values

5 Percentile: 5 percent of all model traces resulted in values less than or equal to the indicated values

-1 Standard Deviation: Values representing one standard deviation below the mean

+1 Standard Deviation: Values representing one standard deviation above the mean

Source: U.S. Bureau of Reclamation Salton Sea Accounting Model, December 2001.

The data in this figure does not reflect implementation of the Salton Sea Habitat Conservation Strategy

**Figure 3.1-28**
**USBR Model Results:**
**Proposed Project Graphs of the Salton Sea**



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**Water Quality.** There are no significance criteria that stipulate a specific federal or state water quality standard for salinity and TSS concentrations in the Salton Sea. Therefore, a finding of significant impact to the Sea, based on a regulatory standard for TSS and salinity, cannot be made at this time. However, it is understood that elevated salinity concentrations can substantially degrade the water quality of the Sea. As salinity concentrations increase, this change in water quality could result in significant impacts to the habitat and biological resources of the Sea. To provide background for potential secondary impacts to biological resources in the Salton Sea, an understanding of the predicted change in salinity of the Sea is presented below. Further analysis of the impacts that elevated salinity levels could have on the biological resources of the Sea is included in Section 3.2—Biological Resources.

Because Colorado River water is the source of most of the irrigation drainage that discharges into the Sea, the salt load carried by this water is eventually transferred to the Sea. However, Reclamation's Salton Sea Accounting Model predicts that the Sea will evaporate faster than it is being replaced by incoming flow, and the salinity of the Sea is expected to increase over time because dissolved salt loadings continue to be concentrated by evaporation.

Reclamation's Salton Sea Accounting Model predicts that the reduced inflows under the Proposed Project will ultimately result in the salinity of the Sea rising from its present concentration of approximately 45,000 mg/L TDS, to over 60,000 mg/L TDS by the year 2012. And, by the year 2077, the Salton Sea Accounting Model predicts that salinity of the Sea will be as high as 162,000 mg/L TDS. In comparison, the Salton Sea Accounting Model results indicate that under future Baseline conditions, the salinity of the Sea will reach 60,000 mg/L TDS by 2023, and ultimately will rise as high as 86,000 mg/L TDS by the year 2077 (see Figure 3.1-28). With implementation of the Salton Sea Habitat Conservation Strategy the predicted salinity of the Salton Sea in 2077 would be 164,000 mg/L (see Figure 3.1-29a). A bar chart comparing the future Baseline TDS concentration to predicted TDS concentrations for the Proposed Project and Alternatives is presented in Figure 3.1-29.

**Impact WQ-10: Potential change in COC concentrations of Salton Sea water column:** Quantitative data on how the reductions in flow affect selenium concentrations in the Salton Sea are not available. However, based on data provided by Setmire and others (USGS 1993, Reclamation 1995), the ecosystem of the Salton Sea effectively removes selenium from the water column to concentrations of 1 µg/L or less. It is unlikely that the Proposed Project would result in an increase in selenium concentrations in the Sea to levels equal to or greater than the 5.0-µg/L level stipulated in the significance criteria. (Less than significant impact.)

**Impact WQ-11: Potential change in pesticide/herbicide deposition in Salton Sea sediments.** Quantitative data on how reductions in flow may affect concentrations of herbicides and pesticides sediment are not available. However, qualitative assumptions indicate that concentrations of herbicides and pesticides in sediment in the Salton Sea are expected to decrease under the Proposed Project.



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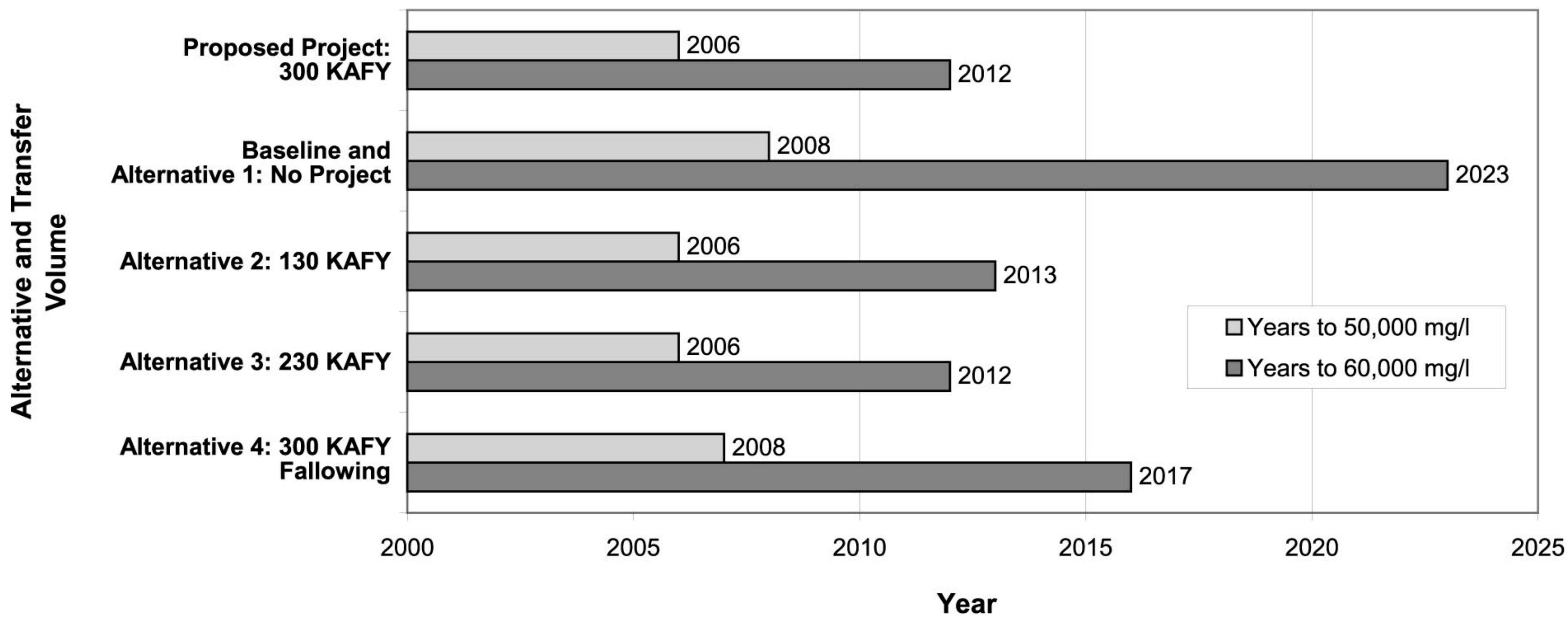


Source: USBR Salton Sea Model - Mean Stochastic Simulation Results

The data in this figure does not reflect implementation of the Salton Sea Habitat Conservation Strategy

**Figure 3.1-29**
**USBR Model Results: Proposed Project versus Project Alternatives Comparison of TDS Concentrations in the Salton Sea**
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