EXECUTIVE SUMMARY

Salton Sea Ecosystem Restoration Program

Draft Programmatic Environmental Impact Report

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The Resources Agency

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SALTON SEA ECOSYSTEM RESTORATION PROGRAM DESCRIPTION

The Salton Sea ecosystem is an extremely valuable resource for resident and migratory birds, including a large number of threatened, endangered, and species of concern. Until recently, the Salton Sea also supported a robust marine sport fishery. Increasing salinity and declining water quality have eliminated the marine fish species, and, with inflows that will be diminishing in the future, threaten the continued ability of the Salton Sea ecosystem to support birds and other wildlife. In recognition of the importance of the Salton Sea ecosystem, the state Legislature established a state policy for restoring the Salton Sea and permanently protecting the fish and wildlife resources dependent upon it.

State law requires that the Secretary for Resources undertake a study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the permanent protection of wildlife dependent on that ecosystem.

This is a summary of the Salton Sea Ecosystem Restoration Study and the Draft Programmatic Environmental Impact Report (PEIR) that are requirements of the Salton Sea Restoration Act and related legislation to implement the Colorado River Quantification Settlement Agreement (QSA). The PEIR and Ecosystem Restoration Study are available on the attached compact disk.

The PEIR evaluates and analyzes potential environmental impacts of alternatives developed for restoration of the Salton Sea. The alternatives were developed through the evaluation of biological, hydrologic, air quality management, geotechnical, and engineering issues at the Salton Sea in response to the project objectives summarized here and described in detail in Chapter 1 of the PEIR.

PURPOSE OF THE PROGRAM

Since the Salton Sea was created by a levee break along the Colorado River in 1905, it has supported a dynamic fishery and currently is an extremely important

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1 The QSA is an agreement among Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), and Metropolitan Water District of Southern California (Metropolitan). It was signed in 2003 to settle a long-standing dispute among the agencies regarding the use of California’s apportionment of Colorado River water. The QSA agreement itself and more than 30 related agreements are commonly referred to as the QSA, and that designation will be used throughout this document.
area for numerous avian species. However, the Salton Sea is continually changing due to the lack of a natural outlet, evaporation, and the quality of inflows. By 2003, these effects had eliminated the marine sport fishery that was established in the 1950s, leaving only a remnant population of the very salt tolerant tilapia as the primary fish species. These changes now threaten the ability of the Salton Sea to continue to support fish, avian, and other wildlife species.

The discussion of Salton Sea restoration cannot take place without recognizing the QSA. The QSA was signed in 2003. It addresses water allocation issues between the holders of water rights to Colorado River water and enables California to stay within its 4.4 million acre-foot annual apportionment of Colorado River water. It also establishes a water transfer from agricultural water users to urban water users. During the first 15 years of the transfer, the Imperial Irrigation District (IID) is providing water to the Salton Sea to meet the inflow trajectory that would have occurred without the transfer. The inflow trajectory includes other activities in the watershed unrelated to the QSA that will result in declining water levels in the Salton Sea. After the first 15 years, this transfer will reduce agricultural return flows to the Salton Sea and accelerate progressive increases in salinity. This will decrease the time that the Salton Sea can continue to support fish, avian, and other wildlife species. The reduced agricultural return flows projected under the QSA will also reduce the physical size of the Salton Sea and expose lake bed sediments (playa) that, with the prevailing winds in this area, could exacerbate dust problems for an already degraded air basin.

One of the conflicts identified during negotiations of the QSA was the extent of ecosystem mitigation and associated need for restoration within the Salton Sea watershed, and specifically for the Salton Sea. Recognizing these conflicts, the Legislature passed Salton Sea restoration legislation to facilitate environmental mitigation and allocate responsibility among water agencies involved in the QSA and the state. Salton Sea restoration legislation not only allowed the QSA to be executed, but also limited environmental mitigation responsibilities for IID, Coachella Valley Water District, and San Diego County Water Authority. The legislation establishes a cost limit on environmental mitigation requirements for the water agencies involved in the QSA. Under the legislation, any future state actions to restore important functions of the Salton Sea will be the sole responsibility of the state.

The Salton Sea restoration legislation requires the Secretary for Resources to undertake a restoration study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the permanent protection of wildlife dependent on that ecosystem. The Salton Sea ecosystem is defined to include, but not be limited to, the Salton Sea, agricultural lands surrounding the Salton Sea, and the tributaries and drains within the Imperial and Coachella valleys that deliver water to the Salton Sea.

The preferred alternative, when determined, is to provide the maximum feasible attainment of the following objectives:

- Restoration of long term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea;
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- Elimination of air quality impacts from the restoration project; and
- Protection of water quality.

This program developed a Salton Sea ecosystem restoration study and PEIR as required by the legislation.

**Purpose of the Draft Programmatic Environmental Impact Report**

The purpose of the PEIR is to develop a preferred alternative by exploring alternative ways to restore important ecological functions of the Salton Sea that have existed for about 100 years. To start that discussion, the draft document contains no preferred alternative, allowing one to be selected only after an open public discussion on the document has taken place. The PEIR describes eight alternatives and compares these to existing conditions and two No Action Alternative scenarios. The PEIR compares for each alternative the functions that are protected, their environmental impacts, and costs. Through the public review and comments on the PEIR, and the assistance of the Salton Sea Advisory Committee, a preferred restoration alternative will be identified for inclusion into the Final PEIR. A funding plan will then be developed to explore the restoration of critical ecological functions of the Salton Sea.

The California Resources Agency is the lead agency for preparation of the PEIR and Ecosystem Restoration Study in accordance with the Salton Sea Restoration Act and related legislation, and the California Environmental Quality Act (CEQA). The PEIR was prepared under the direction of the Department of Water Resources (DWR) and Department of Fish and Game (DFG) on behalf of the Resources Agency and the Secretary for Resources.

**Study Period for the Salton Sea Ecosystem Restoration Program**

The study period for the Salton Sea Ecosystem Restoration Program is consistent with the complete implementation period for the QSA, which is 75 years. This time period is defined as 2003 to 2078.

**Use of the Draft Programmatic Environmental Impact Report**

The PEIR is a programmatic document, the purpose of which is to identify a series of related actions that can be assessed as one project for the purpose of CEQA analysis. The PEIR will serve as an informational document for decision makers, public agencies, non-government organizations, and the general public regarding the potential direct and indirect environmental consequences of implementing any of the alternatives. It also will serve as an information source to be incorporated in future environmental compliance documents for evaluating broad alternatives and cumulative impacts. It is anticipated that future site-specific environmental analysis would be developed based on information from this document.
The PEIR does not include a preferred alternative. The Secretary for Resources will present the preferred alternative to the Legislature after receiving a recommendation from the Salton Sea Advisory Committee and following additional public participation, including input from stakeholders, interested agencies and the public.

**STUDY PARTICIPANTS AND STAKEHOLDER COORDINATION**

The PEIR was prepared in coordination with a variety of federal, state, tribal, local agencies, and other organizations that have an interest in the Salton Sea. Stakeholder participation was facilitated by the Salton Sea Advisory Committee and the various technical sub-groups of the Advisory Committee. The Advisory Committee is comprised of 32 members, and includes representatives from a variety of federal, state, and local public agencies, tribal governments, and non-governmental organizations. They were selected to provide balanced representation of a variety of interests in the Salton Sea in accordance with the Salton Sea Restoration Act and related legislation. The Secretary for Resources consulted with the Advisory Committee and held 20 Advisory Committee and 27 technical sub-group meetings throughout the preparation of the PEIR.

In addition, an extensive public outreach effort was conducted to facilitate public participation in the development of the PEIR. Twenty-eight public outreach meetings were held in communities throughout the Salton Sea watershed and three public outreach meetings were held outside of the Salton Sea watershed prior to the issuance of the PEIR. To keep the public informed on the status of the PEIR process, brochures and updates were distributed via direct mail and email. DWR also launched, and continues to maintain, an extensive Web site at www.saltonsea.water.ca.gov, that provides up-to-date information.

The PEIR is being circulated for a 90-day public review period. Comments received during the public review period will be considered by the lead agency, and responses to comments will be included in the Final PEIR. Additional public outreach meetings will be held prior to the completion of the Final PEIR. Please see www.saltonsea.water.ca.gov for information on these meetings.

**THE SALTON SEA**

The Salton Sea is located in Imperial and Riverside counties (see figure on following page), and is the largest lake in California. It is about 35 miles long and 15 miles wide. The Salton Sea surface water elevation is currently about -228 feet mean sea level (msl) and the greatest water depth is about 50 feet.

Though the current Salton Sea has existed only since 1905, a much larger lake known as Lake Cahuilla filled the Salton Sink on several occasions in past centuries. The Colorado River periodically changed course, and sometimes flowed into the Salton Sink. After flow in the river returned to the Gulf of Mexico, Lake Cahuilla would gradually disappear through evaporation until the next time the Colorado River changed course. Current water development and control projects in the Colorado River Basin prevent the river from returning to the Salton Sink.
The current Salton Sea is a hypersaline and eutrophic (nutrient-rich) water body with no outlet. Most of the water that flows into the Salton Sea is agricultural drain water that was originally diverted from the Colorado River for irrigation use in the Coachella Valley in Riverside County, Imperial Valley in Imperial County, and Mexicali Valley in Mexico. The California agricultural industry’s ability to use the Salton Sea for a repository of agricultural drainage was protected when President Calvin Coolidge in 1924 and 1928 ordered specific sections of land under the Salton Sea to be withdrawn from settlement, location, sale, or entry, and reserved for the purposes of creating a drainage reservoir. Precipitation in the watershed is low and contributes little natural runoff to the Salton Sea.

Until recently, inflows to the Salton Sea contributed about 1,300,000 acre-feet/year and 4,000,000 tons of salts per year. These historic inflows were about equal to the water evaporated from the surface of the Salton Sea. Therefore, the Salton Sea elevation has remained relatively stable. Because the Salton Sea is a terminal body of water, the salinity continues to increase as salts are left behind when water evaporates from the surface. The current salinity averages about 48,000 milligrams/liter (mg/L). Over time, the Salton Sea would naturally become more saline, similar to other terminal water bodies, such as Mono Lake in California, Great Salt Lake in Utah, and Dead Sea in Israel.

The Salton Sea is a dynamic system and is constantly changing over time. Many of these changes, such as the gradual increase in salinity and fluctuations in the elevation, occur naturally. However, the speed at which these changes occur is expected to increase due to ongoing and anticipated future human activities. For example, the QSA, along with other projects in the Coachella, Imperial, and Mexicali valleys, will reduce inflows to the Salton Sea, increasing the salinity and decreasing the elevation, as described in the 2002 Programmatic Environmental Impact Report for Implementation of the Colorado River Quantification Settlement Agreement by Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), Metropolitan Water District of Southern California (Metropolitan), and San Diego County Water Authority (SDCWA).

**IMPORTANCE OF THE SALTON SEA ECOSYSTEM**

The Salton Sea is adjacent to the lower Colorado River delta and the northern portion of the Gulf of California. Due to the significant loss of wetlands in California and other areas, the Salton Sea ecosystem has become one of the most important wetlands for birds in North America and supports some of the highest levels of avian biodiversity in the southwestern United States. Recent studies have documented the great importance of the Salton Sea ecosystem in providing habitat for migrating and resident waterbirds, particularly Pacific Flyway waterbirds.
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More than 400 resident, migratory, and special status bird species have been recorded in the Salton Sea area since its formation, with about 270 of those species using the Salton Sea on a fairly regular basis. In addition to the diversity of birds, studies have indicated that the large number of individual birds using the Salton Sea is even more ecologically relevant than the number of species.

Since the Salton Sea’s formation in 1905, a series of aquatic communities have thrived. A single native fish, the desert pupfish (which is listed as endangered), had inhabited two streams and several inundated springs in the Salton Trough, and persists today in the two streams, agricultural drains, and shallow parts of the Salton Sea. The other original members of the Salton Sea fish community, including carp, striped mullet, humpback sucker, rainbow trout, and bonytail chub, were carried directly from the Colorado River into the Salton Sea as it was filling. In the late 1940s to the mid-1950s, DFG stocked more than 30 species of marine fishes as the salinity of the Salton Sea approached ocean levels. Populations of introduced orangemouth corvina, sargo, and gulf croaker established and thrived. Introduced marine invertebrates, including pileworms and barnacles, came to dominate the lower end of the aquatic food chain, and provided the forage base which supported large fish populations and high bird use. During the 1960s and 1970s, tilapia unexpectedly invaded the Salton Sea from irrigation drains, and ultimately came to dominate the fish community. The tilapia population provided a new abundant forage base for the marine sport fish and fish-eating birds.

Supported by nutrients from agricultural drain water inflows, the Salton Sea fisheries from 1960 to 2000 were phenomenally productive. These popular fisheries were a fundamental driver of the burgeoning recreational use of the Salton Sea during those decades. However, as salinity and nutrients increased in the Salton Sea over time, wildlife health was negatively affected and chronic large scale die-offs of fish and birds fueled the public perception of a deteriorating ecosystem. Starting in 2000, all sport fish populations at the Salton Sea have undergone a dramatic decline due to a combination of increasing salinity and deteriorating water quality. Sargo, gulf croaker, and orangemouth corvina have been undetected in gill net sampling since mid-May 2003. Tilapia populations have rebounded since their lowest recorded levels in 2003, but currently persist in the Salton Sea at levels that are only 10 percent of those recorded in the 1990s.

THE FUTURE OF THE SALTON SEA WITHOUT RESTORATION

Under the QSA and California Fish and Game Code, IID must convey water into the Salton Sea until the year 2017 to mitigate some of the adverse impacts caused by the transfer of water from IID to SDCWA. Between now and 2018, surface water elevations in the Salton Sea would decline due to factors unrelated to the QSA from the existing elevation of about -228 feet msl to -235 feet msl, and salinity would increase from the current level of about 48,000 mg/L to 60,000 mg/L. After 2018, when mitigation water is no longer conveyed to the Salton Sea, inflows and the surface water elevation would decline rapidly and salinity would increase. By 2078, the elevation would be about -260 feet msl and salinity would exceed 300,000 mg/L. The surface water area would decline from the existing 230,000 acres to 213,000 acres in 2018 and 140,000 acres by 2078.
With increased salinity, the aquatic food web would become less complex. The pileworm, a primary component of the Salton Sea food chain, would have reduced reproduction when the salinity exceeds 50,000 mg/L (which could occur as early as 2008). Other invertebrates may already have ceased reproduction. As the salinity increases, more salt tolerant species, such as brine flies and brine shrimp, would increase (which could occur as early as 2020) but would disappear when salinity exceeds 200,000 mg/L (which could occur as early as 2038).

Tilapia serve as the primary forage species for piscivorous (fish-eating) birds at the Salton Sea. Tilapia may be present until salinity exceeds 60,000 mg/L (which could occur as early as 2021). Tilapia could likely continue to persist in lower salinity areas where the rivers, creeks, and drains enter the smaller Salton Sea. How long fish would persist in these areas would depend on the size of the areas and whether wind events would cause enough mixing to increase salinity to levels above fish tolerance.

Other fish would continue to inhabit the drains, as well as constructed pupfish channels and sedimentation and distribution basins that are components of the No Action Alternative. Sailfin mollies and desert pupfish can move easily between the drains via the Salton Sea. Under existing mitigation requirements for the QSA, pupfish channels would be constructed on the sea bed to allow this movement between drains when salinity in the Salton Sea would no longer support these fish.

The decline and ultimate loss of open water fish populations would reduce and possibly eliminate use of the Salton Sea by fish-eating birds, such as pelicans, double-crested cormorants, and black skimmers by the early 2020s. Some of these birds could use the areas where the rivers, creeks, and drains enter the Salton Sea if fish continue to persist in these locations. The relative abundance of bird species that forage on invertebrates likely would change over time with increases in salinity and resultant changes in the invertebrate community.

Snags used for roosting and nesting would disappear by 2020 as the Salton Sea recedes and the snags break and collapse due to degradation by wind, brine, and time. The loss of snags could limit nesting opportunities for several species of colonial nesting birds, including herons and egrets. Loss of nesting or communal roosting areas (snags and islands) for special status birds would be a significant impact.

As the Salton Sea recedes in future years, the distance between the open water shoreline and freshwater wetlands, agricultural lands, and human communities would increase. Though air quality management methods would be implemented, there could be dust from the exposed playa, affecting both wildlife and humans.

**DEVELOPMENT OF ALTERNATIVES**

Salton Sea restoration legislation assigned responsibility to the state to prepare an ecosystem restoration study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and protection of wildlife dependent on that ecosystem. The legislation provided guidelines for establishing the range of alternatives, including consideration for strategies for salinity control, habitat creation and restoration, different shoreline elevations, surface area configurations, and different inflow conditions. However, the legislation did not
specifically identify the alternatives to be considered in the restoration study or environmental document.

During preparation of the PEIR, including the Ecosystem Restoration Study, a series of alternatives was developed to represent a range of methods for restoring the Salton Sea ecosystem and the permanent protection of the fish and wildlife dependent on that ecosystem. These alternatives included strategies for salinity control, habitat creation and restoration, and different shoreline elevations and surface area configurations. In addition, these alternatives considered the range of possible inflow conditions that could occur under a No Action Alternative. The alternatives were developed to provide the maximum feasible attainment of the program objectives, as required by the Fish and Game Code. The statutory program objectives were further defined through discussions with the Salton Sea Advisory Committee, which was established by the restoration legislation to provide recommendations on the restoration plan to the Secretary for Resources. The resultant guidelines defined salinity objectives that ranged from 20,000 to 200,000 mg/L with varying water depths to provide a mosaic of habitat types, support desert pupfish, and reduce vector issues. The objectives also included compliance with endangered species, environmental protection, water quality, and air quality regulations. Using these guidelines, the following concepts were identified:

- **Whole Sea Concepts** – import and export of water to maintain a stable water surface elevation throughout the sea bed, with saltwater disposal outside the sea bed to maintain marine salinity;
- **Partial Sea Concepts** - use of barriers to divide the sea bed to maintain a marine sea in only certain areas, with saltwater disposal outside the sea bed or in a brine sink in the sea bed; and
- **Shallow Saline Habitat Concepts** - use multiple berms to maintain shallow water cells (Saline Habitat Complex) with different salinities and depths in shallow areas of the sea bed, with saltwater disposal outside the sea bed or in a brine sink.

Through a multiple step screening process, the final alternatives were defined based upon the partial sea and shallow saline habitat concepts. The whole sea concepts were not included in the final range of alternatives because adequate surplus water did not exist under Colorado River water rights, and the presence of environmentally protected areas would limit the ability to construct conveyance and divert water from or discharge into the Pacific Ocean and Gulf of California. In addition, import and export using the Gulf of California was not included because Mexico would control access for construction and operations and maintenance. If a waterway is developed from the Gulf of California to Mexicali, a Whole Sea Concept could be re-evaluated.

**DESCRIPTION OF ALTERNATIVES**

The eight final alternatives evaluated in the PEIR consist of one or more of the following components:
✓ **Saline Habitat Complex:** This component would provide a series of 1,000-acre cells with water depths of less than six feet. The cells would be constructed with berms formed by excavating sea bed soils. The sea bed soils also would be used to form islands and peninsulas within the cells. Deep holes would be excavated in some areas of the cells to provide shelter for fish. The salinity in each cell could vary to provide habitat for different fish and/or invertebrate species. Salinity in some cells would be higher than 60,000 mg/L and would only support invertebrates. All of the cells would provide habitat for a variety of birds;

✓ **Deep Marine Sea:** This component would provide habitat similar to historic conditions at the Salton Sea. Salinity objectives would range from 20,000 to 40,000 mg/L to support marine sport fish, such as sargo or corvina. The deepest water could extend to more than 50 feet, depending upon the location of the Marine Sea on the sea bed. The Marine Sea would be formed by a high rockfill barrier that would extend across the sea bed and primarily be constructed using barges. The alternatives were developed based upon a shoreline elevation of -230 feet msl to provide a similar basis of comparison. However, in project-level analyses, a range of shoreline elevations could be evaluated in detail. There is uncertainty about hydrogen sulfide and ammonia accumulation in the deep Marine Seas and the potential for fish kills when these constituents are mixed from lower depths into the water column. This condition currently occurs; however, experts disagree on the probability of this condition continuing in the future, especially after water quality improvements are implemented for the inflows assumed under the No Action Alternative;

✓ **Moderately Deep Marine Sea:** This component also would provide water with salinity ranging from 20,000 to 40,000 mg/L to support marine sport fish. The deepest water could extend to 10 feet. The moderately deep Marine Seas would be formed by low rockfill barriers or geotubes that generally would parallel the existing shoreline and primarily be constructed using barges. The alternatives were developed based upon a shoreline elevation of about -230 feet msl to provide a similar basis of comparison;
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Air Quality Management: In the No Action Alternative and in six of the alternatives, a conservative approach was included based on a combination of monitoring of the exposed playa, and use of irrigated water efficient vegetation or brine stabilization for areas with particulate emissions. This approach would require water conveyance; filtration equipment, and distribution of water in buried drip irrigation pipelines. Use of brine for stabilization of soils and temporary irrigation of native vegetation were considered in one alternative;

Desert Pupfish Connectivity: The desert pupfish is an endangered species that inhabits the agricultural drains and San Felipe and Salt creeks. Due to the protected status of this species, all alternatives incorporate components to ensure the continued survival of this species, and provide varying degrees of connectivity between populations. Currently, the desert pupfish populations have been able to interact by swimming between these areas in the Salton Sea. When the salinity in the Salton Sea exceeds 90,000 mg/L, the water body would not be able to support the desert pupfish. Therefore, the alternatives include a range of methods, depending upon the facilities in each alternative, to allow connections of the drains and creeks to allow for the continued genetic conductivity among the desert pupfish populations;

Brine Sink: The Brine Sink is the water body that the Salton Sea would become through implementation of the alternatives. Runoff from other components, such as the Saline Habitat Complex and Marine Sea, and flows from the rivers and creeks that exceed the flows needed in the habitat components would be conveyed to the Brine Sink. The size and salinity of the Brine Sink would fluctuate throughout any year. However, the Brine Sink area would decline and become more saline over the 75 year study period; and

Freshwater Reservoir: A freshwater reservoir to be constructed by IID is included in one alternative. The reservoir would not be part of the Ecosystem Restoration Program. It would encompass 11,000 acres.

Based on these concepts and components, eight restoration alternatives were developed:

- Alternative 1 – Saline Habitat Complex I;
- Alternative 2 – Saline Habitat Complex II;
- Alternative 3 – Concentric Rings;
- Alternative 4 – Concentric Lakes;
- Alternative 5 – North Sea;
- Alternative 6 – North Sea Combined;
- Alternative 7 – Combined North and South Lakes; and
- Alternative 8 – South Sea Combined
Phased Implementation of the Alternatives

Inflows are projected to change over the 75-year study period in response to implementation of the QSA as well as reductions in flows from Mexico, potential changes in agricultural practices, improved groundwater management in the watershed, and global climate change. Saline Habitat Complex, air quality management, and pupfish connectivity components could not be constructed until the current Salton Sea water level recedes. Therefore, construction would extend for several decades. These changes would cause the impacts and benefits to vary throughout the study period. To provide a better understanding of the timing of the impacts and benefits, the No Action Alternative and the eight alternatives are described for the following four phases in the 75-year study period:

- **Phase I** - Present to 2020: Inflows would be relatively stable until 2018 when flows would decline due to QSA provisions. Planning and design activities would be completed in this phase. Construction would start by 2014 under most alternatives. Many alternatives would have some of the components in operation by 2018.

- **Phase II** - 2020 to 2030: Inflows would decline rapidly. Construction would be completed in this phase for most components.

- **Phase III** - 2030 to 2040: Inflows would be relatively stable. Construction of all facilities would be completed by the end of this phase.

- **Phase IV** - 2040 to 2078: Inflows would change slightly in this phase due to QSA provisions.

Summary of the Alternatives

The restoration alternatives and a No Action Alternative are briefly described below. A detailed description of the alternatives can be found in Chapter 3 of the PEIR. Facilities included in the alternatives are summarized in Table ES-1, located at the end of the Executive Summary. The order in which the restoration alternatives are presented is based on increasing complexity and number of components, and does not indicate any preference.

**No Action Alternative**

CEQA requires the evaluation of a “no project” alternative to allow comparison of impacts of the restoration alternatives with those of not implementing any project. The No Action Alternative, which is the term used in this document for the no project alternative, reflects existing conditions plus changes that are reasonably expected to occur in the foreseeable future if the restoration is not implemented. The description of the No Action Alternative includes two different assumptions regarding inflow patterns over the 75-year study period and construction of QSA related facilities in the sea bed.

**Definition of Inflows for the No Action Alternative**

It is difficult to predict changes in inflows over a 75-year period due to the influences of many future actions that cannot be accurately predicted now.
Therefore, two inflow scenarios were developed for the No Action Alternative in the PEIR.

One scenario is based upon future actions that have been previously defined in environmental documentation, including QSA implementation, reductions in flows from Mexico (due to new wastewater management facilities in Mexicali), and groundwater management in the Coachella Valley. This scenario, referred to as the No Action Alternative-CEQA Conditions, was developed in accordance with the CEQA Guidelines requirement for a no project alternative. The average inflows assumed for the No Action Alternative-CEQA Conditions from 2018 to 2078 would be 922,000 acre-feet/year (as compared to the existing conditions value of 1,300,000 acre-feet/year).

The second scenario is based upon implementation of actions under the No Action Alternative-CEQA Conditions and a conservative projection of changes in inflows due to potential changes in agricultural practices, further reductions in inflows from Mexico, and delayed implementation of groundwater management in the Coachella Valley. The No Action Alternative-CEQA Conditions may not accurately reflect future conditions over the 75-year study period. Therefore, this second scenario, referred to as the No Action Alternative-Variability Conditions, was developed to reflect these future uncertainties, and includes consideration of a wider range of projects and plans potentially developed by others that would affect inflows to the Salton Sea. Future variability is important to consider because it would be difficult to modify facilities should conditions change in the future. Under this scenario, the average inflows from 2018 to 2078 would be 717,000 acre-feet/year. For the purposes of comparison, this more conservative inflow scenario was used to develop Alternatives 1 through 8.

**Facilities to be Constructed under the No Action Alternative**

The No Action Alternative in the PEIR includes numerous actions and facilities to be constructed in accordance with implementation of the QSA. Most of these actions and facilities would not be located within the sea bed and would be considered to occur in all alternatives. However, several of the QSA provisions require actions or construction of components within the sea bed that could be modified substantially through implementation of the PEIR alternatives, including:

- Air Quality Management - Mitigation of particulate emissions from the exposed playa between -235 and -248 feet msl; and
- Pupfish Connectivity - Construction of five pupfish channels on the sea bed.
These measures would be part of the mitigation for the IID Water Conservation and Transfer Program and costs would be jointly funded by IID, SDCWA, and CVWD up to a maximum amount of $133,000,000 (in 2003 dollars). Costs in excess of this amount would be the responsibility of the State, as determined in the QSA. These measures would be modified in each of the alternatives. Estimated costs for implementing these measures and impacts from construction and operations and maintenance are presented in the PEIR for comparative purposes. Facilities and costs would be identical for No Action Alternative-CEQA Conditions and No Action Alternative-Variability Conditions.

**NO ACTION ALTERNATIVE-VARIABILITY CONDITIONS AS OF 2078**

- **Brine Sink** = 140,000 acres
- **Exposed Playa** = 81,000 acres
- **Construction Cost** = $0.8 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $48 Million (2006 dollars)
Alternative 1 - Saline Habitat Complex I

Alternative 1 would provide Saline Habitat Complex in the southern sea bed. Additional features include the Brine Sink, desert pupfish connectivity, and air quality management components.

Pupfish channels would be constructed along the shoreline. However, because these channels will not be connected to each other, five different populations of desert pupfish would be created. San Felipe and Salt creeks would not be connected to other areas and would flow into the Brine Sink.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support tilapia, invertebrates, and a wide variety of birds. Water along the southern shoreline would minimize changes to the effects of the proximity of a large water body on the local climate (microclimate) and aesthetic values in the agricultural lands. Alternative 1 could also provide opportunities for fishing, use of non-motorized boats, bird watching, hiking, hunting, and day use activities.

**ALTERNATIVE 1 AS OF 2078**

- **Saline Habitat Complex** = 38,000 acres
  - Full implementation by 2025
- **Brine Sink** = 123,000 acres
- **Exposed Playa** = 77,000 acres
- **Construction Cost** = $2.3 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $91 Million (2006 dollars)
Alternative 2 - Saline Habitat Complex II

Alternative 2 would be similar to Alternative 1, but with more areas of Saline Habitat Complex. Alternative 2 would include Saline Habitat Complex in both the southern and northern portions of the sea bed. Brine Sink, desert pupfish connectivity, and air quality management components would also be included.

Desert pupfish connectivity would occur in the northern and southern shoreline waterways. However, five different populations of desert pupfish would be created since the shoreline waterways are divided by the Whitewater River in the north and the Alamo and New rivers in the south. San Felipe Creek would be connected to the shoreline waterway during low flow, but would flow into the Brine Sink at high flows. Salt Creek would not be connected to other areas.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support tilapia, invertebrates, and a wide variety of birds. Water along the southern, western, and northern shorelines would minimize changes to the microclimate and aesthetic values in these areas. Alternative 2 could also provide opportunities for fishing, use of non-motorized boats, bird watching, hiking, hunting, and day use activities.

Alternative 2 as of 2078

- Saline Habitat Complex = 75,000 acres
  - Full Implementation by 2031
- Brine Sink = 85,000 acres
- Exposed Playa = 91,000 acres
- Construction Cost = $3.3 Billion (2006 dollars)
- Annual Operations and Maintenance Cost = $107 Million (2006 dollars)
Alternative 3 - Concentric Rings

Alternative 3 would include two Concentric Rings that would provide moderately deep Marine Seas. Brine Sink, desert pupfish connectivity, and air quality management components are also included.

All desert pupfish populations would be connected in the First Ring.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support marine sport fish as well as tilapia, invertebrates, and a wide variety of birds. This alternative also would provide habitat and water along all of the shoreline and connect all desert pupfish populations. Water along the shoreline would minimize changes to the microclimate and aesthetic values. Alternative 3 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

**ALTERNATIVE 3 AS OF 2078**

- **Saline Habitat Complex** = 0 acres
- **Moderately Deep Marine Sea** = 61,000 acres
  
  Full Implementation by 2021
- **Brine Sink** = 68,000 acres
- **Exposed Playa** = 127,000 acres
- **Construction Cost** = $4.9 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $138 Million (2006 dollars)
Alternative 4 - Concentric Lakes

Alternative 4 was defined by the Imperial Group, which is a coalition of Imperial Valley farmers. This alternative is comprised of four separate lakes that provide habitat similar to Saline Habitat Complex without individual cells, with design salinity of 20,000 to 60,000 mg/L. Brine Sink, desert pupfish connectivity, and air quality management components are included.

The First Lake would provide desert pupfish connectivity for all of the direct drains, San Felipe Creek, and other tributary waters along the southern shoreline. The Second Lake would connect all of the northern drains and Salt Creek.

This alternative includes irrigation water supply. However, based upon the information provided by the Imperial Group, no long term irrigation facilities were included. Therefore, long term air quality management is not included in this alternative.

The lakes would be formed by berms using a different method than in the other alternatives. Alternative 4 would use Geotube® berms which deploy geo-membrane tubes filled with dredged material from the sea bed. The berms would primarily be constructed using barges.

The primary benefit of this alternative would be to provide habitat that would support tilapia, invertebrates, and a wide variety of birds. Water along the southern shoreline would minimize changes to the microclimate in the agricultural lands. Water, however, would not be located along the current western or northern shorelines. Alternative 4 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

ALTERNATIVE 4 AS OF 2078

- Lakes (similar to Saline Habitat Complex) = 88,000 acres
  Full Implementation by 2040
- Brine Sink = 22,000 acres
- Exposed Playa = 111,000 acres
- Construction Cost = $2.3 Billion (2006 dollars)
- Annual Operations and Maintenance Cost = $20 Million (2006 dollars)
Alternative 5 - North Sea

Alternative 5 would include a deep Marine Sea at the north side of the sea bed. Other features include Saline Habitat Complex in the south, Brine Sink, desert pupfish connectivity, and air quality management components.

Three separate areas containing desert pupfish would occur along the southern shoreline in the shoreline waterway, including one area that would connect San Felipe Creek. San Felipe Creek would flow to the Brine Sink during high flows. The Marine Sea would connect all of the northern drains and Salt Creek.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support marine sport fish as well as tilapia, invertebrates, and a wide variety of birds. Water along the southern shoreline would minimize changes to the microclimate in the agricultural lands. This alternative also would provide habitat and water along the northern shoreline. Alternative 5 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

**ALTERNATIVE 5 AS OF 2078**

- **Saline Habitat Complex** = 45,500 acres
- **Deep Marine Sea** = 62,000 acres
  - Full Implementation by 2027
- **Brine Sink** = 13,000 acres
- **Exposed Playa** = 117,000 acres
- **Construction Cost** = $4.5 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $134 Million (2006 dollars)
Executive Summary

Alternative 6 - North Sea Combined

Alternative 6 would include a deep Marine Sea in the north combined with a moderately deep Marine Sea in the south, connected along the western shoreline. Saline Habitat Complex would be developed in the southern sea bed. Brine Sink, desert pupfish connectivity, and air quality management components are also included.

Desert pupfish in the drains along the southern shoreline and San Felipe Creek would be connected by the Marine Sea Mixing Zone. A pupfish channel would connect drains that are north of the Alamo River. All of the northern drains and Salt Creek would be connected by the Marine Sea.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support marine sport fish as well as tilapia, invertebrates, and a wide variety of birds. Water along the southern shoreline would minimize changes to the microclimate in the agricultural lands. This alternative also would provide habitat and water along the shoreline along the western and northern shorelines. Alternative 6 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

Alternative 6 as of 2078

- **Saline Habitat Complex** = 29,000 acres
- **Deep and Moderately Deep Marine Seas** = 74,000 acres
  - Full Implementation by 2032
- **Brine Sink** = 11,000 acres
- **Exposed Playa** = 131,000 acres
- **Construction Cost** = $5.9 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $149 Million (2006 dollars)
Alternative 7 - Combined North and South Lakes

Alternative 7 was developed by the Salton Sea Authority and would include a deep Marine Sea (i.e., Recreational Saltwater Lake) in the north combined with a moderately deep Marine Sea (i.e., Recreational Estuary Lake) in the south. Saline Habitat Complex would be developed along the southeastern shoreline. Other features include Brine Sink, desert pupfish connectivity, air quality management components, and an 11,000 acre freshwater reservoir to be operated by IID.

Desert pupfish in drains along the northern and southern shorelines and San Felipe and Salt creeks would be connected by the Saltwater and Estuary lakes. The drains along the southeastern shoreline would not be connected.

Air quality management actions include creation of a protective salt crust using salt crystallizer ponds.

The primary benefits of this alternative would be similar to Alternative 6. The main difference between Alternative 6 and 7 is the location of the barrier. Alternative 7 includes a barrier that would form a larger Marine Sea if average inflows from 2018 to 2078 were 800,000 acre-feet/year. However, to provide a uniform basis of comparison, this alternative also was evaluated assuming an average inflow of 717,000 acre-feet/year. Under the lower flows, the surface area would be smaller and the salinity would be higher than projected in the definition of this alternative. Alternative 7 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

**ALTERNATIVE 7 AS OF 2078**

- **Saline Habitat Complex** = 12,000 acres
- **Deep and Moderately Deep Marine Seas** = 104,000 acres if inflows are 717,000 acre-feet/year. Full implementation of salinity objectives would not occur by 2078. If inflows are 800,000 acre-feet/year, the area would be 115,000 acres and salinity objectives would be accomplished in Phase III
- **Brine Sink** = 15,000 acres
- **Exposed Playa** = 97,000 acres
- **Construction Cost** = $5.2 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $82 Million (2006 dollars)
Alternative 8 - South Sea Combined

Alternative 8 would include a deep Marine Sea in the south combined with a moderately deep Marine Sea in the north, connected along the western shoreline. Saline Habitat Complex would be created along the southwestern and southeastern shorelines. Brine Sink, desert pupfish connectivity, and air quality management components are also included.

Desert pupfish would be connected along the northern and southern shorelines and would include all of the drains and San Felipe Creek. Desert pupfish in Salt Creek would not be connected to other populations.

Air quality management actions include stabilization with brine and irrigation of water efficient vegetation in emissive areas.

The primary benefit of this alternative would be to provide habitat that would support marine sport fish as well as tilapia, invertebrates, and a wide variety of birds. A large water body along the southern shoreline would maintain the microclimate in the agricultural lands.

This alternative also would provide habitat and water along the western and northern shorelines. Alternative 8 could also provide opportunities for fishing, use of motorized and non-motorized boats, water skiing, bird watching, hiking, hunting, swimming, camping, and day use activities.

**ALTERNATIVE 8 AS OF 2078**

- **Saline Habitat Complex** = 18,000 acres
- **Deep and Moderately Deep Marine Seas** = 83,000 acres
  Full Implementation would occur in 2027
- **Brine Sink** = 9,000 acres
- **Exposed Playa** = 128,000 acres
- **Construction Cost** = $5.8 Billion (2006 dollars)
- **Annual Operations and Maintenance Cost** = $145 Million (2006 dollars)
Land Ownership Assumptions

The No Action Alternative and Alternatives 1 through 8 assume that easements or deeds would be obtained for the entire sea bed from -228 feet msl to allow construction and operations and maintenance. Costs of acquisition of easements and deeds are not included in the cost estimates included in the PEIR.

If other land uses extend into the sea bed, the alternatives would need to be modified in project-level analyses. For example, if exposed lands are converted to cultivated agriculture to an elevation of -235 feet msl, either the components would need to be constructed at lower elevations or displacement dikes would be required to protect the agricultural land.

Construction Schedule Assumptions

The schedules assumed that the alternatives could be funded, designed, and permitted in a reasonable time period following the selection of a preferred alternative. This analysis does not include specific assumptions related to the implementing agency, methods to make funding available, or land or easement acquisition. The following assumptions were used in this analysis for pre-construction activities:

- PEIR completed by mid 2007;
- Preferred alternative approved by the Legislature by late 2007;
- Implementing agencies and funding identified by late 2007;
- Project-level analyses and environmental documentation completed by 2010;
- Final design completed by 2012;
- Permits, approvals, and easements or deeds obtained by 2013; and
- Major construction initiated by 2014.

Based upon these assumptions, the alternatives would be constructed over the next 15 to 30 years, as shown in Figure ES-1. The Saline Habitat Complex areas would be constructed as the water recedes when the soils are no longer influenced by high groundwater. Saline Habitat Complex in all alternatives would achieve salinity goals within a one-year period following construction.

Marine Seas in Alternatives 3, 5, 6, 7, and 8 and Concentric Lakes in Alternative 4 would be constructed when the sea bed is inundated to accommodate barges. However, except for Alternative 3, the water bodies would not achieve salinity goals for several years or decades, depending on the alternative.
FIGURE ES-1
ESTIMATED CONSTRUCTION SCHEDULE FOR ALTERNATIVES 1 THROUGH 8

* Would meet salinity objective in 2056 if inflows averaged 800,000 acre-feet per year.
Early Start Habitat

All eight alternatives would include up to 2,000 acres of shallow saline habitat for use by birds after the Salton Sea salinity becomes too high to sustain some species. This habitat would be constructed prior to construction of full-scale habitat components, and is referred to as Early Start Habitat. Early Start Habitat was assumed to be located at elevations between -228 and -232 feet msl. Early Start Habitat would be a temporary feature for two to six years and would be eliminated or assimilated as the alternatives are constructed along the southern shoreline prior to 2020. These lands could subsequently be used for other purposes, including geothermal development, agriculture, and open space.

For the purposes of the PEIR, it was assumed that the Early Start Habitat area would be located along the southern shoreline because the flat slope of the sea bed would provide a large area for the shallow water cells. The area is currently used by many birds. Most agricultural drains in this area are pumped into the Salton Sea and could provide a stable source of inflows into the Early Start Habitat. Saline water from the Salton Sea would be pumped into the cells to be mixed with freshwater from the drains to provide salinity between 20,000 and 60,000 mg/L.
The area would be divided into cells with berms excavated from sea bed materials. Average water depths within each cell would be less than four feet. Temperatures outside the tolerance range of fish, such as tilapia, could cause fish kills or reduce their sustainability. Specific design criteria would be developed in a project-level analysis that could incorporate findings from the U.S. Department of the Interior, Geological Survey (USGS) Salton Sea Shallow Water Habitat Pilot Project.

The Early Start Habitat would require completion of additional studies, environmental documentation, permit applications, and deeds or easements for the land. It is assumed that the Early Start Habitat could be implemented before 2011 if easements or deeds could be acquired.

**Transfers Under the Quantification Settlement Agreement**

Various permits related to the water transfer between IID and SDCWA, under the QSA, require up to 800,000 acre-feet of water conserved by IID to be conveyed into the Salton Sea until the year 2017 to mitigate a portion of the adverse impacts caused by the transfer of water from IID to SDCWA (SWRCB Order WRO 2002-0013). This water is frequently referred to as the (c)(2) water. The QSA and legislation allow for sale of this water to Metropolitan prior to 2017 if the Secretary for Resources determines that the transfer is consistent with the preferred alternative.

The legislation also allows for the transfer of a separate 800,000 acre-feet of conserved water from IID to DWR at $175/acre-foot in 2003 dollars and adjusted for inflation (Fish and Game Code Section 2081.7(c)(1). This water is frequently referred to as (c)(1) water. The QSA and legislation allow for sale of this water to Metropolitan if certain conditions are met.

DWR would be responsible for mitigating any environmental impacts related to the transfer of (c)(1) water and for environmental impacts due to changes in Salton Sea salinity related to the transfer of (c)(2) water.

Transfer of these waters was not considered under the No Action Alternative. However, potential impacts and benefits were considered for Alternatives 1 through 8. A hydrologic/hydraulic model run was conducted to determine the impact on surface water elevations and salinity of the Brine Sink if these waters were transferred starting in 2008. The results indicate that the transfers would cause an additional decline in the Brine Sink surface water elevation by up to two feet by 2020 with the transfer of either (c)(2) or (c)(1) water, and up to four feet with the transfer of both of these waters. The Brine Sink salinity in 2020 would increase by about seven percent with the transfer of either (c)(2) or (c)(1) water, and up to 18 percent with the transfer of both of these waters. There would be minimal or no differences by the end of Phase II or in Phases III and IV.

These changes would affect implementation of the alternatives. For Alternatives 3, 4, 5, 6, 7, and 8, the Brine Sink surface water elevation must remain as high as possible to facilitate construction with the barges. If a water transfers occurred, more of the construction would need to be completed from the shoreline, which would increase the construction costs.
Under Alternatives 1 and 2, transfer of (c)(2) or (c)(1) water could be beneficial because areas for Saline Habitat Complex would be exposed earlier than without the water transfers. However, these benefits would only occur if the environmental documentation, design efforts, and easement or land acquisitions could be completed prior to 2016 when construction of the Saline Habitat Complex would be initiated without the water transfer.

Transfer of the (c)(1) water also would require mitigation of impacts associated with that transfer. The impacts would include exposure of playa earlier than anticipated under the alternatives, and this could change the phasing of implementation of air quality management. In addition, the salinity would increase at a more rapid rate than projected under the alternatives. The higher salinities could result in the need to expand the Early Start Habitat or construct pupfish channels along the shoreline under all alternatives as a short term mitigation measure until habitat components are implemented.

Therefore, the analysis indicates that the transfer of (c)(2) or (c)(1) water could increase the construction costs of Alternatives 3 through 8 because the use of barges would become limited due to the loss of water in the Brine Sink. In addition, there would be a need to accelerate implementation of the air quality management actions and possibly construct short term pupfish channels on the shoreline. These measures would increase the costs of the alternatives. Specific cost estimates were not developed for these short term measures, however, the monetary benefit from the sale of (c)(2) or (c)(1) water does not appear to be significantly greater than the costs associated with the mitigations.

**RESULTS OF THE IMPACT ASSESSMENT**

The results of the impact assessment indicate that all of the alternatives would provide more habitat and water along the shoreline than under the No Action Alternative throughout the study period. The results also indicate that all of the alternatives would provide more habitat benefits than existing conditions.

Construction impacts would occur related to soil disturbance, biological resources, air quality, cultural resources, paleontological resources, noise, visual resources, traffic, and power demands, even after implementation of mitigation measures (referred to as Next Steps in the PEIR). Long term operations and maintenance would result in significant impacts to the resource categories of soils and geology, biological resources, air quality, and visual resources as compared to the No Action Alternative or existing conditions, even after implementation of mitigation measures. The results of the impact assessment are summarized in Table ES-2, presented at the end of the Executive Summary.

**Environmentally Superior Alternative**

In accordance with the CEQA Guidelines, Sections 15120 and 15126.6(c)(2), the PEIR identifies an environmentally superior alternative. To identify the environmentally superior alternative, each of the alternatives was evaluated based on the significance thresholds in Appendix G of the CEQA Guidelines for each resource category. The alternative with the fewest adverse impacts was identified for each resource category, as summarized below.
Overall, and for the reasons summarized below, Alternative 3 would have the least amount of adverse impacts, and, therefore, would be the environmentally superior alternative.

The environmentally superior alternative is not the preferred alternative, which is required to be identified as a result of the Ecosystem Restoration Study, in accordance with the Salton Sea Restoration Act. The Secretary for Resources will present the preferred alternative to the California Legislature following additional public participation, including input from stakeholders and interested agencies, consideration of comments received during the public review period for the Draft PEIR, and after receiving a recommendation from the Salton Sea Advisory Committee.

**Water Resources**

None of the alternatives would have any adverse impacts on surface waters outside of the sea bed. Water quality impacts would occur in the Marine Seas and Saline Habitat Complex due to eutrophic conditions. However, Alternative 8 would have the least adverse impacts because the Marine Sea in the shallower southern sea bed would be better mixed, thereby reducing the accumulation of hydrogen sulfide. Alternative 7 also would have few adverse impacts if proposed use of water treatment plants was effective. The No Action Alternative and Alternative 4 would have the least adverse impacts to groundwater because both alternatives would reduce potential saltwater intrusion into the Coachella Valley.

**Biological Resources**

Impacts to special status species would result primarily from construction of sedimentation and distribution basins at river deltas, isolation of the desert pupfish downstream of pupfish channels, and general disturbance associated with construction along the shoreline, particularly at the southern shore. Alternatives 6 and 7 would have the fewest sedimentation and distribution basins and pupfish channels. Therefore, Alternatives 6 and 7 would have the least impact on special status species due to construction. For a similar reason, Alternatives 6 and 7 would have the least adverse impacts on riparian, sensitive natural communities, and wetlands along the shoreline. Alternative 3 would have the least long term impact on desert pupfish populations because all drains and creeks would be connected into the First Ring. Alternatives 3 and 5 through 8 would have the least adverse impacts related to compliance with local policies that address biological resources because these alternatives include Marine Seas with salinity of 30,000 to 40,000 mg/L. Overall, the impact on desert pupfish movement and connectivity was given the greatest priority because of its status as an endangered species and the long term nature of the impact. Therefore, Alternative 3 was determined to have the least amount of adverse biological impacts.
Geology and Soils Resources

The alternatives that would have the least amount of adverse impacts on soils due to the amount of soils excavated and rock and gravel imported would be Alternatives 1 and 3. Alternatives 1 and 2 would have the least adverse impacts due to seismic risks because these alternatives would have the smallest volumes of water that could be released if all berms, barriers, and perimeter dikes failed simultaneously during a major seismic event.

Air Quality

Air quality impacts would result from fugitive dust associated with construction activities and wind erosion of exposed playa, and exhaust emissions from the combustion of fossil fuels used in equipment and vehicles. Priority was placed on analysis of impacts associated with the nonattainment pollutants: particulate matter less than 10 microns in aerodynamic diameter (PM$_{10}$) and oxides of nitrogen (NOx), an ozone precursor. The No Action Alternative and Alternatives 1 and 2 would have the lowest PM$_{10}$ and NOx emissions, as shown in Figure ES-4, because these alternatives would have the least amount of dredging, imported rock and gravel, and exposed playa. Emissions of PM$_{10}$ during the Peak Construction Year early in the program, are primarily related to truck travel on unpaved roads used for delivery of construction materials. Later in the program, during the Peak Operations and Maintenance Year, PM$_{10}$ emissions are primarily
related to fugitive dust from Exposed Playa areas, after implementation of control measures. Alternative 8, followed by Alternatives 1 and 2, would have the least potential for adverse odor impacts because the shallower and comparatively well mixed nature of the water bodies would reduce the potential for stratification and build up of hydrogen sulfide, ammonia, and other odorous compounds.

![Graph showing emissions during peak construction period from equipment and construction dust.](image)

**FIGURE ES-4**
**COMPARISON OF EMISSIONS DURING CONSTRUCTION AND OPERATIONS AND MAINTENANCE**

**Land Use, Population, and Housing**

Adverse impacts to land use were measured by the ability to provide compliance with local land use plans and to provide water along the existing shoreline. Alternatives 3 and 5 through 8 would comply with the Imperial County General Plan provisions to support a Marine Sea. The No Action Alternative and Alternative 4 would have the least impacts on implementation of the Torres Martinez Indian Tribe land use plans because areas near the northern shoreline would be exposed. Alternative 3 would provide a major water body along the entire current shoreline, and would have the least adverse impacts on current shoreline land uses.
None of the alternatives would have any impacts on population and housing during construction or operations and maintenance activities.

**Recreational Opportunities**
All of the alternatives would provide recreational opportunities. However, the opportunities would vary depending upon the type of water bodies contained in a particular alternative.

**Hazards**
Alternatives 3 and 7 would have the least adverse impacts due to potential exposure to hazards in the sea bed because these alternatives would have the least disturbance of the sea bed.

**Cultural and Paleontological Resources**
Alternatives 3 and 7 would have the least adverse impacts due to disturbance of cultural or paleontological resources in the sea bed because these alternatives would have the least disturbance of the sea bed.

**Noise**
Alternatives 1 and 3 would have the least adverse impacts due to noise because these alternatives would have the least excavation and imported rock and gravel.

**Visual Resources**
Alternative 3 would provide major water bodies along all of the current shoreline, and would have the least adverse impacts on aesthetics from the existing shoreline land uses.

**Public Services**
The need for public services would be related to the extent of construction activities. The amount of excavation and imported rock and gravel were used to identify the alternatives with the most construction activities. Based on this analysis, Alternatives 1 and 3 would have the least adverse impacts on public services.

**Traffic**
Alternatives 1 and 4 would result in the least amount of vehicles during construction and operations and maintenance activities.

**Power and Energy Demands**
Alternatives 1 and 4 would result in the least amount of power demand during operations and maintenance activities.
## Table ES-1
Comparison of Infrastructure Features in Alternatives

<table>
<thead>
<tr>
<th>Component</th>
<th>No Action Alternative - CEQA Conditions</th>
<th>No Action Alternative - Variability Conditions</th>
<th>Alternative 1 Saline Complex Habitat I</th>
<th>Alternative 2 Saline Habitat Complex II</th>
<th>Alternative 3 Concentric Rings</th>
<th>Alternative 4 Concentric Lakes</th>
<th>Alternative 5 North Sea</th>
<th>Alternative 6 North Sea Combined</th>
<th>Alternative 7 Combined North and South Lakes</th>
<th>Alternative 8 South Sea Combined</th>
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<tbody>
<tr>
<td>Air Quality Management Canals and Pumping plants</td>
<td>92 miles 19 pumping plants</td>
<td>92 miles 19 pumping plants</td>
<td>88 miles 28 pumping plants</td>
<td>73 miles 30 pumping plants</td>
<td>78 miles 34 pumping plants</td>
<td>251 miles of temporary irrigation</td>
<td>52 miles 32 pumping plants</td>
<td>55 miles 35 pumping plants</td>
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<td>79 miles 42 pumping plants</td>
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<tr>
<td>Pupfish Channel</td>
<td>30 miles</td>
<td>30 miles</td>
<td>30 miles</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10 miles</td>
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<td></td>
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<tr>
<td>Marine Sea Recirculation Canal and Pumping plant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1 pumping plant</td>
<td>20 miles 1 pumping plant</td>
<td>28 miles 1 pumping plant</td>
<td>20 miles 1 pumping plant</td>
<td>17 miles 1 pumping plant</td>
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<tr>
<td>Deep Marine Sea and Moderately Deep Marine Sea</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>61,000 acres</td>
<td>-</td>
<td>62,000 acres</td>
<td>74,000 acres</td>
<td>104,000 acres</td>
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<td>Saline Habitat Complex Component</td>
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<td>-</td>
<td>38,000 acres</td>
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<td>-</td>
<td>45,500 acres</td>
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<td>Concentric Lakes - Similar to Saline Habitat Complex without separate cells and wide range of salinity</td>
<td>-</td>
<td>-</td>
<td>88,000 acres</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Salton Sea or Brine Sink at 2078</td>
<td>172,000 acres</td>
<td>140,000 acres</td>
<td>123,000 acres</td>
<td>85,000 acres</td>
<td>68,000 acres</td>
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<tr>
<td>Sedimentation and Distribution Basins</td>
<td>3 basins of 200 acres each</td>
<td>3 basins of 200 acres each</td>
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<td>3 basins of 200 acres each</td>
<td>2 basins of 200 acres each</td>
<td>2 basins of 200 acres each</td>
<td>1 basin of 200 acres</td>
<td>1 basin of 200 acres</td>
<td>2 basins of 200 acres each</td>
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</tr>
<tr>
<td>Air Quality Management with water efficient vegetation</td>
<td>24,000 acres</td>
<td>24,000 acres</td>
<td>41,000 acres</td>
<td>46,000 acres</td>
<td>63,000 acres</td>
<td>-</td>
<td>59,000 acres</td>
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<tr>
<td>Air Quality Management with Brine Stabilization</td>
<td>9,000 acres</td>
<td>9,000 acres</td>
<td>17,000 acres</td>
<td>18,000 acres</td>
<td>26,000 acres</td>
<td>-</td>
<td>24,000 acres</td>
<td>26,000 acres</td>
<td>66,500 acres</td>
<td>26,000 acres</td>
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<th>Alternative 8 South Sea Combined</th>
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<tbody>
<tr>
<td>Imperial Irrigation District Reservoir</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11,000 acres</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Treatment Plants</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Volume of imported rock and gravel</td>
<td>1,680,000 cubic yards</td>
<td>1,680,000 cubic yards</td>
<td>6,720,000 cubic yards</td>
<td>11,670,000 cubic yards</td>
<td>85,150,000 cubic yards</td>
<td>7,420,000 cubic yards</td>
<td>53,730,000 cubic yards</td>
<td>93,650,000 cubic yards</td>
<td>79,650,000 cubic yards</td>
<td>100,270,000 cubic yards</td>
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<tr>
<td>Volume of Sea Bed soils excavated or dredged</td>
<td>5,050,000 cubic yards</td>
<td>5,050,000 cubic yards</td>
<td>77,140,000 cubic yards</td>
<td>136,530,000 cubic yards</td>
<td>18,810,000 cubic yards</td>
<td>154,215,000 cubic yards</td>
<td>86,770,000 cubic yards</td>
<td>66,970,000 cubic yards</td>
<td>33,522,000 cubic yards</td>
<td>47,230,000 cubic yards</td>
</tr>
<tr>
<td>Trucks to import rock and gravel per day during peak construction periods</td>
<td>4</td>
<td>4</td>
<td>50</td>
<td>100</td>
<td>1,200</td>
<td>90</td>
<td>1,400</td>
<td>2,500</td>
<td>2,200</td>
<td>2,700</td>
</tr>
<tr>
<td>Employees per day during peak construction period (does not include drivers of trucks in previous row of this table)</td>
<td>500</td>
<td>500</td>
<td>1,000</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Employees per day during operations and maintenance</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>300</td>
<td>25</td>
<td>300</td>
<td>350</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>

Notes:
- = component not included
### Table ES-2

**Summary of Benefit and Impact Assessments**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
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<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I    II   III   IV</td>
<td></td>
</tr>
<tr>
<td><strong>Surface Water Resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Cause alteration of surface waters that would cause erosion, siltation, or flooding.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA   NA   NA   NA</td>
<td>Best Management Practices in accordance with the Stormwater National Pollutant Discharge Elimination System permits.</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L    L    L    L</td>
<td>Define specific locations and use of elevated platforms for facilities on the Sea Bed to protect against flooding.</td>
</tr>
<tr>
<td>Criterion: Cause structures to be placed within 100-year flood hazard area in the Sea Bed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA   NA   NA   NA</td>
<td></td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td>Criterion: Create or contribute runoff water that could cause polluted runoff.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA   NA   NA   NA</td>
<td>Best Management Practices in accordance with Stormwater National Pollutant Discharge Elimination System permit. Collect sludge at the water treatment plant(s) and haul to a certified disposal site.</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td>Criterion: Cause inundation by seiche.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>B    B    B    B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA   NA   NA   NA</td>
<td>None available.</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>B    B    B    B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>B    B    B    B</td>
<td></td>
</tr>
<tr>
<td><strong>Surface Water Quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Violate water quality standard.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>O    O    O    O</td>
<td>Additional studies of influent concentrations and relationships between nutrients in the inflows, sediment, and water column could identify methods to improve water quality.</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA   NA   NA   NA</td>
<td></td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>L    L    L    L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L    L    L    L</td>
<td></td>
</tr>
</tbody>
</table>
## Table ES-2

### Summary of Benefit and Impact Assessments

<table>
<thead>
<tr>
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<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td><strong>Criterion: Substantially degrade water quality.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 – 4 and 6</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>B</td>
</tr>
<tr>
<td>Alternatives 5, 7, and 8</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

### Groundwater Resources

**Criterion: Substantially deplete groundwater supplies, interfere with groundwater recharge, or cause saltwater intrusion**

<table>
<thead>
<tr>
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<th>Changes by Phase</th>
<th>Next Steps</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>O</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>Existing Conditions</td>
<td>O</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Alternatives 2 - 8</td>
<td>Existing Conditions</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>O</td>
<td>S</td>
</tr>
</tbody>
</table>

**Criterion: Cause groundwater quality degradation, not including saltwater intrusion**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
<th>Changes by Phase</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>
Table ES-2
Summary of Benefit and Impact Assessments

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
<th>Changes by Phase&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td><strong>Biological Resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Overall effects (benefits) of implementation on fish and wildlife</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 and 3 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Existing Conditions</td>
<td>S</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Substantial adverse effect on any riparian habitat, other sensitive natural community, or wetlands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 - 3 and 5 - 7</td>
<td>Existing Conditions</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Alternatives 4 and 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>
### Table ES-2
Summary of Benefit and Impact Assessments

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
<th>Changes by Phase¹</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I     II    III   IV</td>
<td></td>
</tr>
<tr>
<td><strong>Criterion: Interfere substantially with the movement of any resident or migratory fish or wildlife species</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative NA NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Alternatives 1 and 2</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative S O O O</td>
<td></td>
</tr>
<tr>
<td>Alternative 3</td>
<td>Existing Conditions S O O O</td>
<td>No Action Alternative S B B B</td>
<td></td>
</tr>
<tr>
<td>Alternative 4 - 8</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative S B B B</td>
<td></td>
</tr>
</tbody>
</table>

### Geology, Soils, Faults, Seismicity, And Mineral Resources

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
<th>Changes by Phase¹</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I     II    III   IV</td>
<td></td>
</tr>
<tr>
<td><strong>Criterion: Exposure of people to risks related to fault rupture, seismic shaking, and seismic-induced ground failure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative NA NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative S S S S</td>
<td></td>
</tr>
</tbody>
</table>

**Facilities would be constructed in accordance with the California Building Code and applicable design standards.**

**Criterion: Exposure of people to risks related to unstable soils**

<table>
<thead>
<tr>
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<th>Basis of Comparison</th>
<th>Changes by Phase¹</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I     II    III   IV</td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative NA NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Alternative 1 - 8</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative S S S S</td>
<td></td>
</tr>
</tbody>
</table>

**Facilities would be constructed in accordance with the California Building Code and applicable design standards.**

**Criterion: Loss of availability of a known mineral resource or a locally important mineral resource recovery site**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Basis of Comparison</th>
<th>Changes by Phase¹</th>
<th>Next Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I     II    III   IV</td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative NA NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions S S S S</td>
<td>No Action Alternative S S S S</td>
<td></td>
</tr>
</tbody>
</table>

**Facilities could be sited to minimize disturbance of mineral resources that are identified as the water recedes. Future construction methods and materials may be able to minimize use of mineral resources.**
### Table ES-2
Summary of Benefit and Impact Assessments

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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td><strong>Climate and Air Quality</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Construction fugitive dust (PM$_{10}$) emissions exceed local significance thresholds of 150 pounds/day (daily threshold) or 70 tons/year (annual threshold)</td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Existing Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Project-level analyses would need to do more detailed emissions estimation, exposure and health impact analysis, and mitigation planning. Control of fugitive dust would reduce human exposures.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion: Hazardous air pollutants (HAPs) in fugitive dust (PM$_{10}$) emissions associated with construction expose sensitive receptors to substantial pollutant concentrations</td>
<td>No Action Alternative</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Existing Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Criterion: Construction exhaust (NO$_x$) emissions exceed local significance thresholds of 100 pounds/day or 50 tons/year</td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Existing Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Alternatives 2 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td>Criterion: Diesel PM$_{10}$ emissions associated with construction expose sensitive receptors to substantial pollutant concentrations</td>
<td>No Action Alternative</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Existing Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>No Action Alternative</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td><strong>Criterion:</strong></td>
<td>Operations and maintenance related fugitive dust (PM$_{10}$) emissions exceed local significance thresholds of 150 pounds/day or 70 tons/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternatives 1, 2, and 4</td>
<td>Existing Conditions</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Alternatives 3 and 5</td>
<td>Existing Conditions</td>
<td>L</td>
<td>N</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>L</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Alternatives 6 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>No Action Alternative</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

**Criterion:** Operations and maintenance related exhaust (NO$_x$) emissions exceed local significance thresholds of 55 pounds/day or 50 tons/year

| No Action Alternative| Existing Conditions | L   | L   | L   | L  |                         |
| No Action Alternative| NA                  | NA  | NA  | NA  | NA |                         |
| Alternatives 1 and 2 | Existing Conditions | L   | L   | L   | L  |                         |
| No Action Alternative| L                   | L   | L   | L   | L  |                         |
| Alternative 3        | Existing Conditions | S   | N   | N   | S  |                         |
| No Action Alternative| S                   | N   | N   | N   | S  |                         |
| Alternative 4        | Existing Conditions | L   | N   | N   | S  |                         |
| No Action Alternative| L                   | N   | N   | N   | S  |                         |
| Alternatives 5 - 8   | Existing Conditions | S   | S   | S   | S  |                         |
| No Action Alternative| S                   | S   | S   | S   | S  |                         |

**Criterion:** Fugitive dust (PM$_{10}$) emissions associated with exposed playa, after air quality management and control measures, exceed local significance thresholds of 150 pounds/day or 70 tons/year

| No Action Alternative| Existing Conditions | L   | N   | S   | S  |                             |
| No Action Alternative| NA                  | NA  | NA  | NA  | NA |                             |
| Alternatives 1 - 8  | Existing Conditions | S   | S   | S   | S  | Project-level analyses would need to do more detailed emissions studies and estimation, control measure identification, impact analysis, and mitigation planning. |
| No Action Alternative| S                   | S   | S   | S   | S  |                             |
### Table ES-2
Summary of Benefit and Impact Assessments

<table>
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<th>Alternative</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<td><strong>Criterion:</strong> Hazardous air pollutants (HAPs) in fugitive dust (PM$_{10}$) emissions associated with playa expose sensitive receptors to substantial pollutant concentrations</td>
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<td>Alternatives 1 - 8</td>
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<tr>
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<tr>
<td><strong>Criterion:</strong> Net emissions increase of nonattainment pollutants exceed general conformity de minimis thresholds of 70 tons/year (PM$_{10}$) and 50 tons/year (NO$_x$)</td>
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<td><strong>Criterion:</strong> Odorous emissions associated with changes in water quality affect a substantial number of people</td>
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<td>Alternatives 5 - 8</td>
<td>Existing Conditions</td>
<td>S</td>
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<tr>
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<td><strong>Criterion:</strong> Changes substantially modify the existing microclimate characteristics adjacent to the Salton Sea</td>
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<td><strong>Criterion: Conflict with Torres Martinez Tribe Land Use Plans</strong></td>
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<td><strong>Criterion: Conversion of agricultural land</strong></td>
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<td><strong>Population And Housing</strong></td>
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<td>No Action Alternative</td>
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<td><strong>Hazards, Hazardous Waste And Public Health</strong></td>
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<td>Criterion: Increased exposure to hazardous materials</td>
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<td>No Action Alternative</td>
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<td><strong>Criterion: Increased risk of consumption of fish and wildlife tissue with high selenium concentrations</strong></td>
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<td><strong>Criterion: Increased risk due to exposure to vectors or disease</strong></td>
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<td>No Action Alternative</td>
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<td><strong>Cultural Resources</strong></td>
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<td>Criterion: Cause substantial adverse change in the significance of a historical or unique archaeological resource or disturb human remains</td>
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<td>Criterion: Physical damage to a scientifically useful fossil or unearthing of fossils and removal without appropriate scientific recordation</td>
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<tr>
<td><strong>Criterion: Create a new source of light or glare</strong></td>
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<td>No Action Alternative</td>
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## Transportation And Traffic

| **No Action Alternative**     | Existing Conditions | L | L  | L   | L  | Comply with all applicable traffic regulations and maintain emergency access. Traffic studies would be conducted to identify methods to minimize impacts. |
|                               | No Action Alternative | NA | NA | NA  | NA |                                    |
| **Alternatives 1 - 8**        | Existing Conditions | L | L  | L   | L  |                                    |
|                               | No Action Alternative | L | L  | L   | L  |                                    |

## Power Production And Energy Resources

| **No Action Alternative**     | Existing Conditions | L | L  | L   | L  | Energy savings measures including conservation and use of alternative energy sources would be considered during project-level analyses. Placement of the extended facilities would need to be evaluated in project-level analyses. |
|                               | No Action Alternative | NA | NA | NA  | NA |                                    |
| **Alternative 4**            | Existing Conditions | L | L  | L   | L  |                                    |
|                               | No Action Alternative | O  | O  | O   | O  |                                    |
| **Alternatives 1 - 3 and 5 - 8** | Existing Conditions | L | L  | L   | L  |                                    |
|                               | No Action Alternative | L | L  | L   | L  |                                    |
### Table ES-2
Summary of Benefit and Impact Assessments

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**Note**

- **a** S = Significant or Potentially Significant Impact
- L = Less than Significant
- O = No Change
- B = Benefit
- U = Unknown
- NA = Not Applicable
- N = Not Analyzed.

**b** The air quality analysis focused on a Peak Construction Year in Phase I, and a Peak Operations Year in Phase IV. For the most part, Phases II and III were not analyzed. Exceptions to this occurred if inferences could be made from the available information. For example, if construction impacts were predicted to be less than significant in the Peak Construction Year, it was inferred that construction impacts would be less than significant in all phases. As another example, if significant or potentially significant impacts were predicted in both Phase I and Phase IV, it was inferred that significant or potentially significant impacts would occur in all phases.
VOLUME I: PEIR

Salton Sea Ecosystem Restoration Program
Draft Programmatic Environmental Impact Report

Prepared for:
State of California
The Resources Agency

Prepared by:
California Department of Water Resources
California Department of Fish and Game

with assistance from:
CH2M HILL
2485 Natomas Park Drive
Sacramento, CA

Contact us at:
(916) 653-8629
or
www.saltonsea.water.ca.gov

State Clearinghouse # 2004021120

October 2006
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CHAPTER 1
INTRODUCTION

This chapter includes the Salton Sea Ecosystem Restoration Program description, background, importance of the Salton Sea ecosystem, enabling legislation, related studies, purpose of the PEIR, study area, study period, Salton Sea Advisory Committee, participants and stakeholder coordination, public involvement process, and a description of the organization of this document.

SALTON SEA ECOSYSTEM RESTORATION PROGRAM DESCRIPTION

The Salton Sea ecosystem is an extremely valuable resource for resident and migratory birds, including a large number of threatened, endangered, and species of concern. Until recently, the Salton Sea also supported a robust marine sport fishery. Increasing salinity and declining water quality have eliminated the marine fish species, and, with inflows that will be diminishing in the future, threaten the continued ability of the Salton Sea ecosystem to support birds and other wildlife. In recognition of the importance of the Salton Sea ecosystem, the state Legislature established a state policy for restoring the sea and permanently protecting the fish and wildlife resources dependent upon it.

State law requires that the Secretary for Resources undertake a study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the permanent protection of wildlife dependent on that ecosystem.

This is a summary of the Salton Sea Ecosystem Restoration Study and the Draft Programmatic Environmental Impact Report (PEIR) that are requirements of the Salton Sea Restoration Act and related legislation to implement the Colorado River Quantification Settlement Agreement (QSA).\footnote{The QSA is an agreement among Coachella Valley Water District (CVWD), Imperial Irrigation District (IID), and Metropolitan Water District of Southern California (Metropolitan). It was signed in 2003 to settle a long-standing dispute among the agencies regarding the use of California’s apportionment of Colorado River water. The QSA agreement itself and more than 30 related agreements are commonly referred to as the QSA, and that designation will be used throughout this document.}

The PEIR evaluates and analyzes potential environmental impacts of alternatives developed for restoration of the Salton Sea. The alternatives were developed through the evaluation of biological, hydrologic, air quality management, geotechnical, and engineering issues at the Salton Sea in response to the project objectives summarized here and described in detail in Chapter 1 of the PEIR.

PURPOSE OF THE PROGRAM

Since the Salton Sea was created by a levee break along the Colorado River in 1905, it has supported a dynamic fishery and currently is an extremely important area for numerous avian species. However, the Salton Sea is continually changing due to the lack of a natural outlet, evaporation, and the quality of inflows. By 2003, these effects had eliminated the marine sport fishery that was established in the 1950s, leaving only a remnant population of the very salt tolerant tilapia as the primary fish species. These changes now threaten the ability of the Salton Sea to continue to support fish, avian, and other wildlife species.

The discussion of Salton Sea restoration cannot take place without recognizing the QSA. The QSA was signed in 2003. It addresses water allocation issues between the holders of water rights to Colorado River water and enables California to stay within its 4.4 million acre-foot annual apportionment of Colorado River water. It also establishes a water transfer from agricultural water users to urban water users. During the first 15 years of the transfer, the Imperial Irrigation District (IID) is providing water to the Salton Sea to meet the inflow trajectory that would have occurred without the transfer. The inflow trajectory includes...
other activities in the watershed unrelated to the QSA that will result in declining water levels in the Salton Sea. After the first 15 years, this transfer will reduce agricultural return flows to the Salton Sea and accelerate progressive increases in salinity. This will decrease the time that the Salton Sea can continue to support fish, avian, and other wildlife species. The reduced agricultural return flows projected under the QSA will also reduce the physical size of the Salton Sea and expose lake bed sediments (playa) that, with the prevailing winds in this area, could exacerbate dust problems for an already degraded air basin.

One of the conflicts identified during negotiations of the QSA was the extent of ecosystem mitigation and associated need for restoration within the Salton Sea watershed, and specifically for the Salton Sea. Recognizing these conflicts, the Legislature passed Salton Sea restoration legislation to facilitate environmental mitigation and allocate responsibility among water agencies involved in the QSA and the state. Salton Sea restoration legislation not only allowed the QSA to be executed, but also limited environmental mitigation responsibilities for IID, Coachella Valley Water District, and San Diego County Water Authority. The legislation establishes a cost limit on environmental mitigation requirements for the water agencies involved in the QSA. Under the legislation, any future state actions to restore important functions of the Salton Sea will be the sole responsibility of the state.

The Salton Sea restoration legislation requires the Secretary for Resources to undertake a restoration study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the permanent protection of wildlife dependent on that ecosystem. The Salton Sea ecosystem is defined to include, but not be limited to, the Salton Sea, agricultural lands surrounding the Salton Sea, and the tributaries and drains within the Imperial and Coachella valleys that deliver water to the Salton Sea.

The preferred alternative, when determined, is to provide the maximum feasible attainment of the following objectives:

- Restoration of long term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea;
- Elimination of air quality impacts from the restoration project; and
- Protection of water quality.

This program developed a Salton Sea ecosystem restoration study and PEIR as required by the legislation.

**Purpose of the Draft Programmatic Environmental Impact Report**

The purpose of the PEIR is to develop a preferred alternative by exploring alternative ways to restore important ecological functions of the Salton Sea that have existed for about 100 years. To start that discussion, the draft document contains no preferred alternative, allowing one to be selected only after an open public discussion on the document has taken place. The PEIR describes eight alternatives and compares these to existing conditions and two No Action Alternative scenarios. The PEIR compares for each alternative the functions that are protected, their environmental impacts, and costs. Through the public review and comments on the PEIR, and the assistance of the Salton Sea Advisory Committee, a preferred restoration alternative will be identified for inclusion into the Final PEIR. A funding plan will then be developed to explore the restoration of critical ecological functions of the Salton Sea.

The California Resources Agency is the lead agency for preparation of the PEIR and Ecosystem Restoration Study in accordance with the Salton Sea Restoration Act and related legislation, and the California Environmental Quality Act (CEQA). The PEIR was prepared under the direction of the Department of Water Resources (DWR) and Department of Fish and Game (DFG) on behalf of the Resources Agency and the Secretary for Resources.
BACKGROUND

The Salton Sea is located in Imperial and Riverside counties, as shown in Figure 1-1, and is the largest lake in California. It is about 35 miles long and 15 miles wide. The Salton Sea surface water elevation is currently about -228 feet mean sea level (msl) and the greatest water depth is about 50 feet.

Though the current Salton Sea has existed only since 1905, a much larger lake known as Lake Cahuilla filled the Salton Sink on several occasions in past centuries. The Colorado River periodically changed course, and sometimes flowed into the Salton Sink. After flow in the river returned to the Gulf of Mexico, Lake Cahuilla would gradually disappear through evaporation until the next time the Colorado River changed course. Current water development and control projects in the Colorado River Basin prevent the river from returning to the Salton Sink.

The current Salton Sea is a hypersaline and eutrophic (nutrient-rich) water body with no outlet. Most of the water that flows into the Salton Sea is agricultural drain water that was originally diverted from the Colorado River for irrigation use in the Coachella Valley in Riverside County, Imperial Valley in Imperial County, and Mexicali Valley in Mexico. The California agricultural industry’s ability to use the Salton Sea for a repository of agricultural drainage was protected when President Calvin Coolidge in 1924 and 1928 ordered specific sections of land under the Salton Sea to be withdrawn from settlement, location, sale, or entry, and reserved for the purposes of creating a drainage reservoir. Precipitation in the watershed is low and contributes little natural runoff to the Salton Sea.

Until recently, inflows to the Salton Sea contributed about 1,300,000 acre-feet/year and 4,000,000 tons of salts per year. These historic inflows were about equal to the water evaporated from the surface of the Salton Sea. Therefore, the Salton Sea elevation has remained relatively stable. Because the Salton Sea is a terminal body of water, the salinity continues to increase as salts are left behind when water evaporates from the surface. The current salinity averages about 48,000 milligrams/liter (mg/L). Over time, the Salton Sea would naturally become more saline, similar to other terminal water bodies, such as Mono Lake in California, Great Salt Lake in Utah, and Dead Sea in Israel.

The Salton Sea is a dynamic system and is constantly changing over time. Many of these changes, such as the gradual increase in salinity and fluctuations in the elevation, occur naturally. However, the speed at which these changes occur is expected to increase due to ongoing and anticipated future human activities. For example, the QSA, along with other projects in the Coachella, Imperial, and Mexicali valleys, will reduce inflows to the Salton Sea, increasing the salinity and decreasing the elevation, as described in the 2002 Programmatic Environmental Impact Report for Implementation of the Colorado River Quantification Settlement Agreement by Coachella Valley Water District (CVWD), IID, Metropolitan Water District of Southern California (Metropolitan), and San Diego County Water Authority (SDCWA).

IMPORTANCE OF THE SALTON SEA ECOSYSTEM

The Salton Sea is adjacent to the lower Colorado River delta and the northern portion of the Gulf of California. Due to the significant loss of wetlands in California and other areas, the Salton Sea ecosystem has become one of the most important wetlands for birds in North America and supports some of the highest levels of avian biodiversity in the southwestern United States. Recent studies have documented the great importance of the Salton Sea ecosystem in providing habitat for migrating and resident waterbirds, particularly Pacific Flyway waterbirds. More than 400 resident, migratory, and special status bird species have been recorded in the Salton Sea area since its formation, with about 270 of those species using the Salton Sea on a fairly regular basis. In addition to the diversity of birds, studies have indicated that the large number of individual birds using the Salton Sea is even more ecologically relevant than the number of species.
In addition to the diversity of birds, studies have indicated that the large number of individual birds using the Salton Sea is even more ecologically relevant than the number of species. The Salton Sea for birds has become an internationally significant stopover site for hundreds of thousands of transients moving north and south along the ‘Pacific Flyway,’ and east into the Great Basin/Prairie Pothole region as well as the winter home for hundreds of thousands of individuals of numerous species from around North America (Cooper, 2004). For several species, the Salton Sea supports a significant portion of their regional or North American populations. For example, an estimated 75 percent of the New World population of eared grebes (Patten et al., 2003), 23 to 30 percent of the North American breeding population of American white pelicans (Shuford et al., 2000), and 50 percent of the Pacific flyway population of ruddy ducks (Jehl, 1994) has been recorded at the Salton Sea. In addition, 40 percent of the California population of black skimmers have been found to breed at the Salton Sea (Collins and Garrett, 1996). The nesting colony of gull-billed terns is the largest in the western United States (Molina, 2000). In terms of overall shorebirds, the Salton Sea is the most important area in the Intermountain and Desert region of the West in the spring and the second most important, after Great Salt Lake, in the fall. The Salton Sea is one of only three sites, along with the Central Valley of California and the Willamette Valley of Oregon, where tens of thousands of shorebirds winter (Shuford et al., 2004), and qualifies for designation as a site of international importance to shorebirds under criteria of the Western Hemisphere Shorebird Reserve Network (Harrington and Perry, 1995, cited in Shuford et al., 2002). The Salton Sea supports the largest population of wintering snowy plovers in the interior of western North America (Shuford et al. 1995), and is one of a handful of key breeding areas in the interior of California (Page et al. 1991, cited in Shuford et al., 2002).

The Salton Sea is one of the most important sites in western North America for migrating black terns (Shuford et al., 2002), with tens of thousands reported during the period of peak occurrence in mid-summer (Small 1994, cited in Shuford et al., 2002), representing about 10 percent of the global population (Cooper, 2004). Surveys indicate that the Salton Sea ecosystem supports about 40 percent of the endangered Yuma clapper rail’s entire U.S. population (Cooper, 2004).

The Imperial Valley is one of the most important areas for white-faced ibis in western North America, supporting at least 30 percent of the global population during the fall migration and 50 percent of the California wintering population (Cooper, 2004). It also supports 70 percent of the California population of burrowing owls. Surveys in 1999 indicate that the Imperial Valley is even more important than previously recognized for the mountain plover, supporting up to 40 percent of the species’ entire population (Shuford et al., 2002).

Since the Salton Sea’s formation in 1905, a series of aquatic communities have thrived. A single native fish, the desert pupfish (which is listed as endangered), had inhabited two streams and several inundated springs in the Salton Trough, and persists today in the two streams, agricultural drains, and shallow parts of the Salton Sea. The other original members of the Salton Sea fish community, including carp, striped mullet, humpback sucker, rainbow trout, and bonytail chub, were carried directly from the Colorado River into the Salton Sea as it was filling. In the late 1940s to the mid-1950s, DFG stocked more than 30 species of marine fishes as the salinity of the Salton Sea approached ocean levels. Populations of introduced orangemouth corvina, sargo, and gulf croaker established and thrived. Introduced marine invertebrates, including pileworms and barnacles, came to dominate the lower end of the aquatic food chain, and provided the forage base which supported large fish populations and high bird use. During the 1960s and 1970s, tilapia unexpectedly invaded the Salton Sea from irrigation drains, and ultimately came to dominate the fish community. The tilapia population provided a new abundant forage base for the marine sport fish and fish-eating birds.
Supported by nutrients from agricultural drain water inflows, the Salton Sea fisheries from 1960 to 2000 were phenomenally productive. These popular fisheries were a fundamental driver of the burgeoning recreational use of the Salton Sea during those decades. However, as salinity and nutrients increased in the Salton Sea over time, wildlife health was negatively affected and chronic large scale die-offs of fish and birds fueled the public perception of a deteriorating ecosystem. Starting in 2000, all sport fish populations at the Salton Sea have undergone a dramatic decline due to a combination of increasing salinity and deteriorating water quality. Sargo, gulf croaker, and orangemouth corvina have been undetected in gill net sampling since mid-May 2003. Tilapia populations have rebounded since their lowest recorded levels in 2003, but currently persist in the Salton Sea at levels that are only 10 percent of those recorded in the 1990s.

THE FUTURE OF THE SALTON SEA WITHOUT RESTORATION

Under the QSA and California Fish and Game Code, IID must convey water into the Salton Sea until the year 2017 to mitigate some of the adverse impacts caused by the transfer of water from IID to SDCWA. Between now and 2018, surface water elevations in the Salton Sea would decline due to factors unrelated to the QSA from the existing elevation of about -228 feet msl to -235 feet msl, and salinity would increase from the current level of about 48,000 mg/L to 60,000 mg/L. After 2018, when mitigation water is no longer conveyed to the Salton Sea, inflows and the surface water elevation would decline rapidly and salinity would increase. By 2078, the elevation would be about -260 feet msl and salinity would exceed 300,000 mg/L. The surface water area would decline from the existing 230,000 acres to 213,000 acres in 2018 and 140,000 acres by 2078.

With increased salinity, the aquatic food web would become less complex. The pileworm, a primary component of the Salton Sea food chain, would have reduced reproduction when the salinity exceeds 50,000 mg/L (which could occur as early as 2008). Other invertebrates may already have ceased reproduction. As the salinity increases, more salt tolerant species, such as brine flies and brine shrimp, would increase (which could occur as early as 2020) but would disappear when salinity exceeds 200,000 mg/L (which could occur as early as 2038).

Tilapia serve as the primary forage species for piscivorous (fish-eating) birds at the Salton Sea. Tilapia may be present until salinity exceeds 60,000 mg/L (which could occur as early as 2021). Tilapia could likely continue to persist in lower salinity areas where the rivers, creeks, and drains enter the smaller Salton Sea. How long fish would persist in these areas would depend on the size of the areas and whether wind events would cause enough mixing to increase salinity to levels above fish tolerance.

Other fish would continue to inhabit the drains, as well as constructed pupfish channels and sedimentation and distribution basins that are components of the No Action Alternative. Sailfin mollies and desert pupfish can move easily between the drains via the Salton Sea. Under existing mitigation requirements for the QSA, pupfish channels would be constructed on the sea bed to allow this movement between drains when salinity in the Salton Sea would no longer support these fish.

The decline and ultimate loss of open water fish populations would reduce and possibly eliminate use of the Salton Sea by fish-eating birds, such as pelicans, double-crested cormorants, and black skimmers by the early 2020s. Some of these birds could use the areas where the rivers, creeks, and drains enter the Salton Sea if fish continue to persist in these locations. The relative abundance of bird species that forage on invertebrates likely would change over time with increases in salinity and resultant changes in the invertebrate community.

Snags used for roosting and nesting would disappear by 2020 as the Salton Sea recedes and the snags break and collapse due to degradation by wind, brine, and time. The loss of snags could limit nesting opportunities for several species of colonial nesting birds, including herons and egrets. Loss of nesting or communal roosting areas (snags and islands) for special status birds would be a significant impact.
As the Salton Sea recedes in future years, the distance between the open water shoreline and freshwater wetlands, agricultural lands, and human communities would increase. Though air quality management methods would be implemented, there could be dust from the exposed playa, affecting both wildlife and humans.

**OTHER SALTON SEA RESTORATION STUDIES**

Over the past 40 years, more than 20 studies and investigations with several hundreds of alternatives have been completed to address the environmental problems at the Salton Sea, as described in Chapter 4. Individual study objectives have differed, but the main focus has generally been on controlling salinity and elevation of the Salton Sea to support fish and wildlife and the associated recreation and community goals.

In 1992, Congress enacted the Reclamation Projects Authorization and Adjustment Act (Public Law 102-575) which established that restoration of the Salton Sea was of national interest. This law directed the Secretary of the Interior to conduct a research project for the development of a method or combination of methods to reduce and control salinity, provide endangered species habitat, enhance fisheries, and protect human recreational values … in the area of the Salton Sea.

In 1993, IID, CVWD, and Riverside and Imperial counties formed a joint powers authority, the Salton Sea Authority, to manage and operate the Salton Sea for the improvement of water quality, stabilization of water elevation, and to enhance recreational and economic development potential.

Subsequently, the Salton Sea Reclamation Act of 1998 (Public Law 105-372) was enacted by Congress to further the restoration process. That law directed that the Secretary of the Interior shall 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 Water Supply, Reliability, and Environmental Improvement Act of 2004 (Public Law 108-361) directed the Secretary of the Interior to complete a feasibility study on a preferred alternative for Salton Sea restoration. The feasibility study is to be prepared in coordination with the State and the Salton Sea Authority.

**Quantification Settlement Agreement**

In 2003, the QSA was signed by IID, CVWD, and Metropolitan to settle long-standing disputes among the agencies regarding use of California’s apportionment of Colorado River water. The QSA and more than 30 related agreements cover intrastate management of Colorado River water, allow California to have access to special surplus water for a 15-year period, and provide for specified water transfers. The QSA and related agreements are the mechanism by which these water agencies are reducing their use of Colorado River water to California’s basic apportionment of 4.4 million acre-feet annually from a larger historic quantity. The QSA components provide a framework for conservation measures and water transfers for a period of up to 75 years. QSA water transfers from IID to SDCWA and CVWD will reduce the inflows of agricultural runoff that constitute the Salton Sea’s primary source of water.

**Legislation Related to Salton Sea Ecosystem Restoration**

In the period of 2002 through 2004, the California Legislature enacted a series of bills collectively known as QSA legislation. The QSA legislation, Senate Bill 482 (Kuehl, 2002), Senate Bill 277 (Duchen, 2003), Senate Bill 317 (Kuehl, 2003), Senate Bill 654 (Machado, 2003), and Senate Bill 1214 (Kuehl, 2004), amended various provisions of the Fish and Game Code and the Water Code. One of these bills,
Senate Bill 277 (Ducheny, 2003), established the Salton Sea Restoration Act (Fish and Game Code Section 2930 et seq.). The Salton Sea Restoration Act provides that it is the Legislature’s intent that the State of California undertake the restoration of the Salton Sea ecosystem, and the permanent protection of the wildlife dependent on that ecosystem. The Act also establishes a Salton Sea Restoration Fund to be administered by the Department of Fish and Game. A companion bill, Senate Bill 317 (Kuehl, 2003), directs the Secretary for Resources to prepare an ecosystem restoration study and programmatic environmental documents, as specified, to establish a Salton Sea Advisory Committee, and includes specific consultation requirements. (Fish and Game Code Section 2081.7; Water Code Section 1013).

**Water Transfers**

Under the QSA and Fish and Game Code, a total of up to 800,000 acre-feet of water conserved by IID will be conveyed into the Salton Sea until the year 2017 to mitigate a portion of the adverse impacts caused by the transfer of water from IID to SDCWA (Fish and Game Code Section 2081.7(c)(2)). The Fish and Game Code also allows for the transfer of a separate 800,000 acre-feet of conserved water from IID to DWR at $175/acre-foot in 2003 dollars and adjusted for inflation (Fish and Game Code Section 2081.7(c)(1)). These two allocations of water are referred to as (c)(2) water and (c)(1) water, respectively. No (c)(1) or (c)(2) water may be transferred unless the Secretary for Resources determines that the transfer is consistent with the preferred alternative. DWR will be responsible for mitigating any environmental impacts related to the transfer of (c)(1) water and for environmental impacts due to changes in Salton Sea salinity related to the transfer of (c)(2) water. DWR will be able to sell the (c)(1) water and any available (c)(2) water to Metropolitan at a price of not less than $250/acre-foot in 2003 dollars and adjusted for inflation. Monies from these sales, after deducting costs and reasonable administrative expenses, will be deposited into the Salton Sea Restoration Fund (described below).

The PEIR analyzes the impact of the transfer of water that is currently being used to mitigate impacts of the QSA on the Salton Sea ((c)(2) water) and describes a plan for the use of this water.

**Preparation of a Restoration Study**

The Salton Sea Restoration Act states the intent of the Legislature that the State of California undertake the restoration of the Salton Sea ecosystem and permanent protection of wildlife dependent on that ecosystem based upon the preferred alternative developed in a restoration study and the alternative selection process (Fish and Game Code Section 2930 et seq.). The restoration study must evaluate the alternatives for the restoration of the Salton Sea that include consideration of strategies for salinity control, habitat creation and restoration, different water surface elevations along the shoreline, water surface area configurations, and range of inflow conditions (Fish and Game Code Section 2081.7(e)(2)(A)).

Fish and Game Code Section 2931 requires the restoration study to identify a preferred alternative that will provide the maximum feasible attainment of the following objectives:

- Restoration of long term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea;
- Elimination of air quality impacts from the restoration projects; and
- Protection of water quality.

The restoration study also must include at least one most cost-effective, technically feasible alternative and present an evaluation of the magnitude and practicability of costs of construction, operation, and maintenance for each alternative. The study is required to be submitted to the Legislature (Fish and Game Code Section 2081.7).
For the purposes of the PEIR, the Salton Sea ecosystem includes, but is not limited to, the Salton Sea, agricultural lands surrounding the Salton Sea, and tributaries and drains within the Imperial and Coachella valleys that deliver water to the Salton Sea (Fish and Game Code Section 2931(d)).

The Resources Agency must also undertake the necessary activities to assess the protection of recreational opportunities, including, but not limited to, hunting, fishing, boating, and birdwatching, and the creation of opportunities for improved local economic conditions, surrounding the Salton Sea, unless the Resources Agency determines that those activities would constitute a project purpose for the PEIR (Fish and Game Code Section 2081.8). The Resources Agency evaluated the alternatives to assess recreational opportunities and potential for improved local economic conditions. However, specific recreational facilities were not defined in the PEIR alternatives.

Consultation with Other Agencies and Interest Groups

The Secretary for Resources is required to undertake the restoration study in consultation with the DFG, DWR, the Salton Sea Authority, appropriate air quality districts, and the Salton Sea Advisory Committee, as described in Fish and Game Code Section 2081.7. The Secretary also must extend an invitation to the U.S. Department of the Interior, Geological Survey Salton Sea Science Office to participate in the restoration study. The Secretary for Resources also must pursue a memorandum of understanding with the Secretary of the Interior to obtain federal participation in the restoration of the Salton Sea.

The Secretary for Resources is required to establish an Advisory Committee to provide balanced representation of the following interests in the process:

- Agriculture;
- Local governments;
- Conservation groups;
- Tribal governments;
- Recreational users;
- Water Agencies;
- Air Pollution Control Districts;
- Geothermal Energy Development; and
- Appropriate federal agency representatives.

The Resources Agency is required to consult with the Advisory Committee throughout all stages of the alternative selection process. The Advisory Committee must meet at least six times per year. The Secretary for Resources was required to appoint and work with a vice chair of the Advisory Committee to develop Advisory Committee agendas and schedule meetings of the Advisory Committee. The Secretary for Resources and vice chair must appoint and work with an agenda subcommittee to assist in preparation of the Advisory Committee agendas.

The Advisory Committee is to provide recommendations to the Resources Agency to assist in preparation of the restoration plan in accordance with a schedule established by the Resources Agency to ensure that the recommendations could be considered in a timely and meaningful manner as the restoration plan is developed. The recommendations may include, but are not limited to:

- Specific goals and objectives of the restoration plan;
- Range of alternative restoration actions that must be developed and analyzed;
- Description of the No Action Alternative;
- Criteria for determining economic and technical feasibility;
- Range of options for funding of the restoration plan; and
- Selection of the preferred alternative for the restoration plan.
The Resources Agency is required to periodically update the Advisory Committee on the work plan and schedule for development of the restoration plan.

Funding of Restoration Plan

Fish and Game Code Section 2081.7(c)(2)(D) requires preparation of a proposed funding plan to implement the preferred alternative. The proposed funding plan must include a determination of money that is, or may be, available to construct and operate the preferred alternative, including, but not limited to:

- Salton Sea Restoration Fund (described below);
- State water and environmental bond funds;
- Federal authorizations and appropriations;
- Money available through a Salton Sea Infrastructure Financing District (as described in Government Code Section 53395.9) and local assessments by the Salton Sea Authority or its member agencies; and
- Money derived from user or other fees.

The Salton Sea Restoration Fund includes money from the following actions:

- Total of $30,000,000 paid by CVWD, IID, and SDCWA, as required by Fish and Game Code Section 2081.7;
- Not less than $20/acre-foot of water received by Metropolitan as special surplus water under the reinstatement of access to water under the U.S. Department of the Interior Interim Surplus Guidelines for operations of the Lower Colorado River in accordance with Fish and Game Code Section 2081.7;
- Up to 10 percent of the monies received by IID for additional water transfers. The fee does not apply to transfers addressed in the QSA or water transfers pursuant to a Defensive Transfer Agreement as defined in the Agreement for Acquisition of Conserved Water between IID and Metropolitan, in accordance with Water Code Section 1013; and
- Money from sale of (c)(1) water and (c)(2) water, as described above.

Money deposited in the Salton Sea Restoration Fund will be administered by the Director of DFG and expended, upon appropriation by the Legislature, for the following purposes in accordance with Fish and Game Code Section 2932:

- Environmental and engineering studies related to the restoration of the Salton Sea and protection of fish and wildlife dependent on the Salton Sea;
- Implementation of conservation measures necessary to protect the fish and wildlife species dependent upon the Salton Sea, including adaptive management measures, and limited to the Salton Sea and lower Colorado River ecosystems, including the Colorado River Delta;
- Implementation of the preferred Salton Sea restoration alternative; and
- Administrative, technical, and public outreach costs related to the development and selection of the preferred Salton Sea restoration alternative.
Chapter 1
Introduction

OBJECTIVES OF THE SALTON SEA ECOSYSTEM RESTORATION PEIR

CEQA requires preparation of an Environmental Impact Report (EIR) when an agency action, such as approval and implementation of Salton Sea ecosystem restoration program, may have a significant impact on the environment. An EIR is a document used by a governmental agency to analyze the significant environmental effects, to identify alternatives, and to disclose possible ways to reduce or avoid the possible environmental damage.

A programmatic EIR is used to document a series of inter-related actions that can be assessed as an integrated whole for the purpose of CEQA analysis. The actions may be related in one or more of the following ways:

- By geographical proximity;
- As logical parts in a chain of contemplated actions;
- In connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or
- As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects that can be mitigated in similar ways.

This PEIR relates to the first and second bullets above (i.e., it consists of a series of actions related by geographic proximity and are logical parts in a chain of contemplated actions), and is being prepared to ensure that the combined effects of the contemplated actions are evaluated.

As described above, the legislation directs the Secretary for Resources to complete the PEIR and Ecosystem Restoration Study. The PEIR and Ecosystem Restoration Study are to be prepared in consultation with the Salton Sea Advisory Committee. The PEIR and Ecosystem Restoration Study are to contain an evaluation of alternatives for restoring the Salton Sea ecosystem and the permanent protection of the fish and wildlife dependent on that ecosystem, including at least one most cost-effective, technically feasible alternative. These alternatives are to consider strategies for salinity control, habitat creation and restoration, and different shoreline elevations and surface area configurations. In addition, these alternatives must consider a range of possible inflow conditions.

Selection of the Preferred Alternative

CEQAs directives are written with the premise that the lead agency is reacting to a proposal or request or a discretionary action and conducting an environmental review of a “proposed project” (see CEQA Guidelines Sections 15124(a), (b); 15126(a); 15126.2(a); and 15126.6). Therefore, compliance with CEQA, in preparing an Environmental Impact Report (EIR), typically relates to analysis of the proposed project and alternatives (based on the proposed project’s objectives). However, CEQA provides discretion for the lead agency to propose several alternatives for achieving certain objectives, without identifying one of the alternatives as the “proposed project” in the draft EIR, as long the draft EIR contains sufficient level of detail of all the alternatives, as if any of them were the proposed project. The lead agency has the discretion to determine the alternative to be selected as the “proposed project” in the final EIR, after all environmental analysis has been completed, provided that the alternatives with the potential for being selected have been adequately analyzed in the EIR.

The preferred alternative is to provide the maximum feasible attainment of the following objectives in accordance with Fish and Game Code, as described above:
• Restoration of long term stable aquatic and shoreline habitat for historic levels and diversity of fish and wildlife that depend on the Salton Sea;
• Elimination of air quality impacts from the restoration project; and
• Protection of water quality.

The PEIR includes an assessment of the magnitude and practicability of costs of construction and operations and maintenance of each alternative evaluated (see Appendix H).

This PEIR does not include a preferred alternative. A preferred alternative will be identified in the Final PEIR. The Secretary for Resources will present the preferred alternative to the California Legislature after receiving a recommendation from the Salton Sea Advisory Committee and following additional public participation, including input from stakeholders and interested agencies, as well as comments received during the public review period following distribution of the PEIR.

STUDY AREA

The study area includes the entire Salton Sea watershed that covers most of Imperial County, much of Coachella Valley in Riverside County, small portions of San Bernardino and San Diego counties, and the northern portion of the Mexicali Valley, as shown in Figure 1-1. Although the study area includes the entire Salton Sea watershed, less emphasis is being placed on areas that are both distant from the Salton Sea and/or not likely to be impacted by the alternatives, such as the ridgelines and other mountainous areas within the watershed and areas in Mexico. In addition, the study area is also defined for each resource area, and not all of the technical evaluations include analyses in the full study area. Rather, the study area for the technical analyses sections focuses on the areas that may be impacted by implementation of the restoration activities.

The Colorado River downstream from Parker Dam (located in San Bernardino County) was originally considered for inclusion in the study area because this area is connected to the Salton Sea via diversion and use of Colorado River water in the Salton Sea watershed. In addition the Gulf of California was also originally included in the study area because some migratory birds use habitat in both the Gulf of California and the Salton Sea watershed. However, based upon input received from stakeholders and the Advisory Committee, the reasonable range of alternatives considered in this PEIR are focused on changes within the Salton Sea. Therefore, the study area has been limited to the Salton Sea watershed.

STUDY PERIOD

The study period for this PEIR extends from 2003 to 2078. This 75-year study period is the same period for which the QSA could be in effect.

SALTON SEA ADVISORY COMMITTEE

The Advisory Committee is composed of 32 members, and includes representatives from a variety of federal, State, and local public agencies, Tribal governments, and non-governmental organizations, as presented in Table 1-1. They were selected to provide balanced representation of a variety of interests in the Salton Sea in accordance with the Salton Sea Restoration Act and related legislation. The Secretary consulted with the Advisory Committee throughout the preparation of the PEIR.

STUDY PARTICIPANTS AND STAKEHOLDER COORDINATION

This PEIR was prepared in coordination with a variety of federal, State, and local agencies and organizations that have an interest in the Salton Sea. Stakeholder participation was facilitated by the
Salton Sea Advisory Committee, as listed in Table 1-1, and the various technical sub-groups of the Committee. In addition, DWR and DFG held numerous meetings with other stakeholders throughout the preparation of this PEIR.

A Technical Committee and several issue specific Working Groups were established to facilitate technical analysis and stakeholder participation. The Technical Committee was formed early in the PEIR process to address a broad range of data needs and analyses. Based on the Technical Committee’s efforts and interest by the meeting attendees, Working Groups were formed to address more focused technical issues—alternatives and infrastructure, air quality, habitat, inflows/modeling, and development of a process to select the preferred alternative.

PUBLIC INVOLVEMENT PROCESS

A Notice of Preparation (NOP) was filed with the California State Clearinghouse and distributed to over 300 agencies, organizations, and individuals on February 27, 2004. An erratum to the NOP was filed with the California State Clearinghouse on March 15, 2005.

Five public scoping meetings were held during mid- to late-March 2004. In addition to public scoping meetings, the U.S. Department of the Interior, Bureau of Indian Affairs arranged a scoping meeting for several Indian tribes with DWR on March 16, 2004 at the Torres Martinez Tribal Headquarters. DWR and DFG, on behalf of the Resources Agency, received over 70 written responses to the NOP from federal agencies, tribes, State agencies, regional authorities, local government agencies, non-governmental organizations, and individuals. In addition, the five scoping meetings were attended by over 150 people, many of whom provided oral comments on the environmental compliance process, scope and content of the PEIR, and the legislative authority and mandate for conducting the restoration study. The NOP and the scoping summary report are provided in Appendix B.

An extensive public outreach effort was conducted to facilitate public participation in the development of this PEIR. This effort is described in detail in Chapter 26. Twenty-eight public outreach meetings were held in communities throughout the Salton Sea watershed prior to the issuance of the PEIR. All of the meetings were held in a townhall format to facilitate continued and open interaction with the public. The meetings were noticed using a variety of methods, including direct mailings to a mailing list of over 500 individuals, posters placed in various locations throughout the watershed, radio and television public service announcements, notices in six local newspapers, and press releases. To keep the public informed on the status of the PEIR process, brochures and Updates were distributed via direct mailing. DWR also launched and continues to maintain an extensive website at www.saltonsea.water.ca.gov, which provided up-to-date information.

This PEIR is being circulated for a 90-day public review period. Comments received during the public review period will be considered by the lead agency, and responses to comments will be included in the Final PEIR. Additional public outreach meetings will be held prior to the completion of the Final PEIR. Please see www.saltonsea.water.ca.gov for information on these meetings and to obtain the PEIR.
Table 1-1
Salton Sea Advisory Committee Members

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<thead>
<tr>
<th><strong>Federal Agencies</strong></th>
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<tr>
<td>U.S. Department of the Interior, Bureau of Indian Affairs</td>
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<td>U.S. Department of the Interior, Bureau of Reclamation</td>
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<td>U.S. Department of the Interior, Fish and Wildlife Service</td>
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<td>U.S. Department of the Interior, Geological Survey</td>
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<td>U.S. Environmental Protection Agency</td>
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<th><strong>Tribal Governments</strong></th>
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<td>Cabazon Band of Mission Indians</td>
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<td>Torres Martinez Desert Cahuilla Indians</td>
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<th><strong>State Agencies</strong></th>
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<td>California Air Resources Board</td>
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<td>Colorado River Basin Regional Water Quality Control Board</td>
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<td>State Water Resources Control Board</td>
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<th><strong>Regional and Local Agencies</strong></th>
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<td>Coachella Valley Association of Governments</td>
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<td>Coachella Valley Water District</td>
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<td>County of Imperial</td>
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<td>County of Riverside</td>
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<td>Imperial County Air Pollution Control District</td>
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<td>Imperial Irrigation District</td>
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<td>Imperial Valley Association of Governments</td>
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<td>San Diego County Water Authority</td>
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<td>South Coast Air Quality Management District</td>
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<td>The Metropolitan Water District of Southern California</td>
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<th><strong>Non-governmental Organizations</strong></th>
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<td>Audubon California</td>
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<td>CalEnergy Operating Corporation</td>
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<td>California Farm Bureau Federation</td>
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<td>California Waterfowl Association</td>
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<td>Citizens Congressional Task Force on the New River</td>
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<td>Defenders of Wildlife</td>
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<td>Imperial County Farm Bureau</td>
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<td>Pacific Institute</td>
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<td>Planning and Conservation League</td>
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<td>Riverside County Farm Bureau</td>
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<td>Sierra Club</td>
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<td>United Anglers of Southern California</td>
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Note: Agencies/organization are listed in alphabetical order
PEIR ORGANIZATION

This PEIR is organized in the following sections:

- **Chapter 1, Introduction**—This chapter introduces the Resources Agency as the lead agency under CEQA, describes the objectives of the PEIR, presents information needed to understand the objectives of the PEIR, provides an overview of the study area and study period, and provides an overview of the Salton Sea Advisory Committee, the study participants, and the public involvement process.

- **Chapter 2, Development of Alternatives**—This chapter describes the approach used to develop the range of alternatives analyzed in the Draft PEIR.

- **Chapter 3, Description of Program Alternatives**—This chapter presents a description of the alternatives analyzed in the Draft PEIR including the assumptions, limitations of the assumptions, potential implementation concepts and schedules, and estimated costs.

- **Chapter 4, Summary of Previous Studies and Related Projects**—This chapter presents a summary of previous studies addressing Salton Sea ecosystem restoration and related water and natural resources management projects that affect the Salton Sea and the biological resources that depend on the Salton Sea.

- **Chapters 5 through 22**—These chapters contain a description of the study area, regulatory requirements, historical perspective, data sources and limitation, and existing conditions for each of the environmental resource areas considered in detail. These chapters also contain a description of the environmental impacts and next steps, if there are any, for each of the alternatives considered in the PEIR. The environmental resource areas considered in detail include the following: surface water resources; surface water quality; groundwater; biological resources; geology, soils, faults, seismicity, and mineral resources; climate and air quality; land use; population and housing; recreation; hazards, hazardous waste, and public health; cultural resources; paleontological resources; noise; aesthetics and visual resources; public services and utilities; transportation and traffic; power production and energy; and economic and social effects.

- **Chapter 23, Cumulative Impacts**—This chapter discusses potential and existing projects, that, together with the Salton Sea Ecosystem Restoration Program, may have a compounding impact on similar resources.

- **Chapter 24, Growth Inducing Impacts**—This chapter describes the potential for the alternatives to promote growth in the Salton Sea region.

- **Chapter 25, Permits and Approvals**—This chapter provides a listing and summary of some of the permits and approvals that may be needed for implementation of the alternatives.

- **Chapter 26, Public Involvement, Consultation, and Coordination**—This chapter provides an overview of the public involvement, consultation, and coordination efforts during the preparation of this PEIR.

- **Chapter 27, List of Preparers**—This chapter lists the contributors to this document, including those who wrote and reviews sections.

- **Chapter 28, Bibliography**—This chapter contains the references for the information presented in this PEIR.
• **Chapter 29, List of Abbreviations and Glossary**—This chapter contains a list of abbreviations and a glossary of terms used in this PEIR.

The PEIR also includes the following appendices:

• **Appendix A, Salton Sea Ecosystem Restoration Legislation and Excerpts from the Fish and Game Code and Water Code**—This appendix includes the state legislation and excerpts from the Fish and Game Code and Water Code described in Chapter 1.

• **Appendix B, Notice Of Preparation, Erratum to the Notice Of Preparation, Summary of Scoping Meeting Comments, and Responses to Notice of Preparation**—The Notice of Preparation, erratum to the Notice of Preparation, scoping report and scoping comments are provided in Appendix B.

• **Appendix C, Description of the Habitat-Based Bird Model**—This appendix provides a detailed description of the Habitat-based Bird Model discussed in Chapter 8.

• **Appendix D, Water Quality Modeling Methodology and Results**—This appendix includes a detailed description of the water quality modeling methodology and results that are described in Chapter 6.

• **Appendix E, Climate and Air Quality Impact Assessment**—This appendix provides a detailed description of the assumptions and analyses conducted to determine the potential air quality impacts of the final range of alternatives, as summarized in Chapter 10.

• **Appendix F, Ecological Risk Assessment**—This appendix describes the analyses of ecological risks in the water bodies in the final range of alternatives, as summarized in Chapter 8.

• **Appendix G, Screening-Level Human Heath Risk Assessment of Selenium Exposures from Consumption of Fish and Waterfowl from the Salton Sea**—This appendix describes the analyses of human health risks associated with consuming fish or waterfowl that spend portions of their life-stages at the Salton Sea under the final range of alternatives, as summarized in Chapter 14.

• **Appendix H, Ecosystem Restoration Study**—This appendix provides the Ecosystem Restoration Study including detailed engineering information and cost estimates for the final range of alternatives. A description of the following is also provided in Appendix H: habitat components of the alternatives; hydrology and hydrologic models used to analyze the alternatives; measures considered to control playa emissions; conceptual designs for in-sea rock barriers; potential rock sources; infrastructure components; and design and construction considerations for the final alternatives.

• **Appendix I, Alternative-Specific Materials Provided by the Imperial Group and the Salton Sea Authority**—This appendix provides copies of the materials submitted by the Imperial Group and the Salton Sea Authority on Alternative 4 and 7, respectively.
CHAPTER 2
DEVELOPMENT OF ALTERNATIVES

This chapter describes the approach used to develop a range of alternatives to be analyzed in the Draft Programmatic Environmental Impact Report (PEIR). The alternatives development process must include consideration of strategies for habitat creation and restoration with salinity control and different water surface configurations under a range of possible inflow conditions. The process also included consideration of methods to provide the maximum feasible attainment of the objectives described in Chapter 1, including:

- Restoration of long term stable aquatic and shoreline habitat for historic levels and diversity of fish and wildlife that depend on the Salton Sea;
- Elimination of air quality impacts from the restoration actions; and
- Protection of water quality.

DEVELOPMENT OF THE RANGE OF ALTERNATIVES FOR THE PEIR

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) describe a range of alternatives that would feasibly attain most of the objectives, and avoid or substantially lessen any significant effects. The range of alternatives should be selected and described in a manner to allow for public participation and informed decision making.

The CEQA Guidelines also describes the following factors that may be considered when defining feasible alternatives:

- Suitability of sites to be used for facilities;
- Economic viability;
- Availability of infrastructure;
- General plan consistency;
- Regulatory limitations;
- Regional jurisdictional boundaries; and
- Ability to legally acquire, control, or have access to the site for implementation.

These factors were considered to the greatest extent possible given the programmatic nature of the PEIR, as described below.

The PEIR evaluated potential concepts and the full range of alternatives with respect to general plan consistency; regulatory limitations; regional jurisdictional boundaries; and ability to legally acquire, control, or have access to the site for implementation. Detailed information would need to be collected and evaluated in project-level analyses to define specific sizes and locations of facilities in the preferred alternative.

ISSUES TO BE CONSIDERED IN THE PEIR

Issues to be considered in the development of alternatives were specifically defined by the objectives as described in Chapter 1 and identified by Salton Sea Advisory Committee members and other stakeholders and members of the public, as described below. In addition, alternatives identified and evaluated in more than 20 studies completed over the past 40 years were reviewed to understand and consider technical and engineering issues identified in past studies, and physical, biological, and community related issues associated with the Salton Sea ecosystem.
Chapter 2
Development of Alternatives

**Issues Identified by the Salton Sea Advisory Committee Members and Other Stakeholders**

The Salton Sea Advisory Committee identified a range of issues to be considered in development of the alternatives. The following issues were discussed at Salton Sea Advisory Committee meetings and public workshops:

- Protection and/or restoration of habitat for threatened or endangered species, including consideration of results of Biological Opinions developed as part of the Quantification Settlement Agreement (QSA), Coachella Valley Multiple Species Habitat Conservation Plan, and on-going efforts for development of Natural Community Conservation Plans;
- Consideration of the importance of the Salton Sea with respect to the Pacific Flyway;
- Consideration of unique habitats that cannot be specifically duplicated in other locations or that become unique due to the synergy between habitats at or near the Salton Sea, or because of the proximity to the Colorado River Delta;
- Approaches that reduce potential eco-risks due to selenium and nutrient concentrations that could accumulate in various habitats;
- Consideration of approaches that include adaptive management;
- Preservation of agricultural land that provides habitat in the watershed;
- Preservation of the Salton Sea for storage of agricultural runoff and seepage from irrigated lands in the Imperial and Coachella valleys;
- Protection of micro-climate that occurs along lands adjacent to the existing Salton Sea shoreline;
- Consideration of tribal interests at the Salton Sea and in the watershed;
- Consideration for integrating potential geothermal power generation;
- Focus the ecosystem restoration within the Salton Sea watershed;
- Implement air quality management methods for Exposed Playa;
- Assume land use general plans of Imperial and Riverside counties and the Torres Martinez Tribe would be fully implemented along the Salton Sea shoreline and throughout the watershed;
- Consideration for local recreational and economic development, especially opportunities that would do no harm or improve conditions; and
- Establishment of a long term monitoring and research program because many aspects of the Salton Sea ecosystem existing conditions are not understood or fully defined.

Similar issues were identified during the scoping process for this PEIR, as described in Appendix B.

**Alternatives Considered in Previous Studies**

Previous studies identified and evaluated the following alternatives:

- Divide the Salton Sea with barriers across the Sea Bed (currently inundated area within the existing Salton Sea shoreline) or parallel to the existing shoreline to develop at least two water...
bodies: Smaller Salton Sea on one side of the barrier with marine salinity and a Brine Sink on the other side of the barrier for salt disposal;

- Maintain a smaller Salton Sea at marine salinity and pump water to evaporation ponds. Locations of the evaporation ponds evaluated in previous studies varied from areas adjacent to the existing shoreline to dry lake beds located outside of the watershed. In some studies, evaporation rates were increased by using a process referred to as Enhanced Evaporation Systems that involved spraying or misting the water into the air. In some studies, solar ponds were considered to evaporate water and simultaneously generate electricity. Other studies evaluated conveyance of salt water to the existing geothermal generating power plants on the southeastern Salton Sea shoreline to be used either for cooling systems or injection into the groundwater;

- Pump water and salts from the Salton Sea to the upper portion of the Gulf of California or the Pacific Ocean along the Southern California coast. The studies also evaluated conveying marine water from the Gulf of California or the Pacific Ocean to the Salton Sea. Some of the studies evaluated hydropower generation as part of the conveyance facilities;

- Convey water by gravity from the Colorado River or pump recycled wastewater to the Salton Sea, and pump water and salts from the Salton Sea to solar ponds, evaporation ponds, or Pacific Ocean;

- Separate a portion of the Sea Bed with displacement dikes to provide freshwater or brackish water lakes and/or wetlands near the confluences of the New, Alamo, and Whitewater rivers or separate areas within the Sea Bed. Water and salts would be discharged to a Brine Sink or evaporation/solar ponds. In some studies, desalination was considered to improve water quality;

- Use a barrier in the Sea Bed to maintain a smaller Salton Sea and a separate Brine Sink. In some studies, most of the inflow was treated by desalination facilities and made available for transfer for municipal uses. Remaining land in the Sea Bed could be reclaimed for agriculture; and

- Maintain a smaller Salton Sea with hypersaline conditions and establish brackish wetlands near the confluences of the New, Alamo, and Whitewater rivers and along the existing shoreline.

Many of these alternatives were developed to provide salinity and elevation control to support recreational and local economic opportunities. Habitat and water quality improvements were considered for the purpose of supporting fish and wildlife that provided recreational opportunities. Silt and nutrient controls upstream of the Salton Sea and use of treatment wetlands were also included in many studies. The screening criteria for many studies limited the range of alternatives to those that could be financed by local communities either directly or through the sale of water to users located outside of the watershed.

**DEVELOPMENT OF ALTERNATIVES FOR THIS PEIR**

A multi-step process was used for development of the final range of alternatives. This process began with the description of the No Action Alternative (Step 1). Objectives were developed as described in Chapter 1 (Step 2). General concepts were defined to meet the objectives (Step 3). The concepts were compared to broad screening criteria based upon legislative objectives, regulatory requirements, and technical feasibility. The concepts that met these broad screening criteria were further defined and referred to as configurations (Step 4). Initial engineering layouts and biological analyses were developed for each of the configurations and reviewed with the Salton Sea Advisory Committee and the public. The configurations were modified and additional configurations were developed based upon the comments. Configurations that were considered to be feasible based upon the objectives and legislative and regulatory compliance were identified as the final alternatives to be evaluated in the PEIR (Step 5).
Step 1: Description of the No Action Alternative

The No Action Alternative is intended to reflect existing conditions at the time of the filing of the Notice of Preparation plus changes that are reasonably expected to occur in the foreseeable future if the action is not implemented, based on current plans. For the purposes of this PEIR, the terminology of No Action Alternative is equivalent to the CEQA terminology of No Project Alternative. A No Action Alternative will frequently include foreseeable projects and predictable actions, which are events and changes that are neither existing conditions nor impacts of the other alternatives. The No Action Alternative is based on projections of conditions that would occur if the other alternatives were not implemented. In the PEIR, the No Action Alternative will serve as one basis for comparison of other alternatives. The PEIR also describes the environmental setting for each resource (described in the document as Existing Conditions), and those Existing Conditions are used as another basis for comparison with each alternative.

The No Action Alternative was developed using the following process:

- Identification of existing projects and management policies that were implemented as of the date of issuance of the Notice of Preparation (NOP) for the PEIR, February 27, 2004;
- Identification of potential projects that have been considered for implementation within the study area, by Tribal, federal, State, regional and local agencies;
- Development and application of screening criteria for the No Action Alternative to identify projects that would be implemented without Salton Sea restoration actions considered in the PEIR alternatives; and
- Identification of changes to management policies that have been or would have been implemented after February 27, 2004 without Salton Sea restoration actions considered in the PEIR alternatives.

Projects included in the No Action Alternative-CEQA Conditions generally have secured agency approvals including mitigation measures and permit requirements and are not considered to be speculative in nature. Based upon these assumptions, the No Action Alternative-CEQA Conditions was developed to describe future conditions over the 75-year study period.

The 75-year study period includes a long planning horizon, and, therefore, the No Action Alternative-CEQA Conditions may not accurately reflect future conditions. A No Action Alternative-Variability Conditions was developed to reflect these future uncertainties. The No Action Alternative-Variability Conditions includes a wider range of projects and plans. It was important to consider future variability because if conditions change, it would be difficult to move or otherwise modify structures identified in the alternatives. Specific assumptions related to projects and plans included in the No Action Alternative-CEQA Conditions and No Action Alternative-Variability Conditions are described in Chapter 3.

Implementation of the projects included in the No Action Alternative would have an overall effect of reducing flows into the Salton Sea as compared to Existing Conditions, as described in more detail in Chapter 5. The historical average inflows from 1950 to 2002 were about 1,296,000 acre-feet/year. Average inflows over the study period of 2003 to 2078 could range from 964,500 acre-feet/year under the No Action Alternative-CEQA Conditions to 795,000 acre-feet/year under the No Action Alternative-Variability Conditions.

Changes in inflows would decrease the Salton Sea surface water elevation from -228 feet mean sea level (msl) under Existing Conditions to -248 and -260 feet msl under No Action Alternative-CEQA Conditions and No Action Alternative-Variability Conditions, respectively, by 2078. The reduction in inflows would increase salinity from 48,000 mg/L under Existing Conditions to 138,000 and 200 mg/L, respectively.
308,000 mg/L under No Action Alternative-CEQA Conditions and No Action Alternative-Variability Conditions, respectively, by 2078.

The value of the Salton Sea to fish and wildlife is dependent on the availability of water with salinity that supports viable forage populations. Future projections of declining inflows suggest that many of the areas that currently provide high value for birds (e.g., river deltas) would be in different locations as Salton Sea water recedes. Other features, such as snags and islands, would no longer function as the Salton Sea recedes and changes in water quality would influence the quality of habitat in many of these areas.

Step 2: Identification of Objectives

The objectives were developed in coordination with the Salton Sea Advisory Committee and are based on the Fish and Game Code, the Water Code, and federal and State laws pertaining to protection of endangered and threatened species, water quality, and air quality:

- Restore long term stable aquatic and shoreline habitat for historic levels and diversity of fish and wildlife that depend upon the Salton Sea to a maximum feasible attainment level;
- Restore the Salton Sea ecosystem and provide permanent protection of wildlife dependent on that ecosystem;
- Protect water quality to support beneficial uses;
- Eliminate air quality impacts caused by implementation of ecosystem restoration to a maximum feasible attainment level;
- Protect special status species in accordance with federal and State endangered species acts;
- Protect water quality in accordance with the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) Water Quality Control Plan and other federal and State requirements; and
- Protect air quality in accordance with local air quality management districts’ State Implementation Plans and other federal and State requirements.

Incorporation of Comments

During the preparation of the PEIR, the objectives defined in Chapter 1 were discussed with the Salton Sea Advisory Committee, stakeholders, and the public to further define some of the terms, as follows:

- **Objective:** Restore long term stable aquatic and shoreline habitat for historic levels and diversity of fish and wildlife that depend upon the Salton Sea to a maximum feasible attainment level:
  - Historic levels and diversity was further defined as being based upon recent fish and wildlife conditions; and
  - Stable aquatic and shoreline habitat was further defined as being based upon a stable water surface area over the study period - but not necessarily upon a specific elevation (see Fish and Game Code Section 2081.7(e)(2)(A));

- **Objective:** Restore the Salton Sea ecosystem and provide permanent protection of wildlife dependent on that ecosystem:
  - The Salton Sea ecosystem was further defined to include the area within the Salton Sea; rivers, creeks, and drains tributary to the Salton Sea; and agricultural lands near the Salton Sea; and
Chapter 2
Development of Alternatives

- Permanent protection was further defined to include reliability during and after substantial seismic or climatological events;

**Objective:** Protect water quality to support beneficial uses. Water quality to support beneficial uses was further defined to:

- Provide areas with salinity of 30,000 to 40,000 mg/L that would sustain historic diversity of aquatic organisms;

- Provide areas with salinity of 20,000 to 30,000 mg/L. Water with salinity less than 20,000 mg/L would not be included in the alternatives because lower salinity would increase the potential for avian disease, mosquito populations, selenium ecotrust, and nuisance vegetation;

- Provide areas with salinity of 40,000 to 200,000 mg/L which represents the salinity at which most of this historic fish could not be supported, however, a productive ecosystem of tilapia, desert pupfish, and some invertebrates could be supported;

- Reduce the effects of nutrients that could cause eutrophication; and

- Reduce the effects of selenium that can cause health risks to fish, wildlife, and humans;

**Objective:** Eliminate air quality impacts caused by implementation of the restoration actions to a maximum feasible attainment level:

- Air quality impacts were further defined to include air quality problems that could occur during construction and operations and maintenance.

### Step 3: Development of Concepts

Historic habitats included a marine salinity water body (Salton Sea) with brackish water estuaries at the confluences of rivers, creeks, and drains, as described in Appendix H-1. To restore or recreate these habitat functions and values, general concepts were developed. The concepts do not include details of locations, sizes, or specific facilities such as methods to comply with air quality management requirements. These issues were addressed in Step 4, Development of Configurations.

Objectives identified in Step 2 were further defined in this step through discussions with the Salton Sea Advisory Committee. Based upon the comments, the following guidelines were developed to define the concepts:

- Restoration actions inside the Sea Bed to support historic habitat functions and values would provide water with marine salinity (30,000 to 40,000 mg/L), promote habitat diversity by maintaining a mosaic of habitat types with salinity from 20,000 to 200,000 mg/L, including functions and values of the estuaries, and habitat complexity by providing water in some areas with depths greater than 6 feet. To provide a range of alternatives, some concepts include water bodies with salinity in the entire range and other concepts only included salinity ranging from 20,000 to 40,000 mg/L;

- Compliance with water quality regulations to support beneficial uses of habitats;

- Compliance with endangered species regulations, including a water body to provide a connection between the drains and creeks to exchange genetic material for desert pupfish;

- Restoration actions outside the Sea Bed to support wildlife that are dependent upon the restored Salton Sea would be consistent with local conservation plans and identical or similar for all alternatives; and
• Restoration actions would be developed to promote flexibility to allow for future changes in habitat conditions and status of individual species, and to incorporate information generated by monitoring programs to reduce future uncertainties and provide a scientific basis for future adaptive management.

Using these guidelines, the following concepts were identified:

• **Whole Sea Concepts**
  – Import water to the Salton Sea to maintain a stable water surface elevation throughout the Sea Bed with areas of deep water and estuarine conditions at the confluences with the rivers, creeks, and drains;
  – Saltwater disposal outside of the Sea Bed to maintain marine salinity; and
  – Pupfish connectivity between the drains and/or creeks would occur in the Whole Sea;

• **Partial Sea Concepts**
  – Divide the Sea Bed with one or more barriers to maintain waters with brackish water quality and/or marine water quality, and depending upon the location of the water body, existing areas of deep water would be maintained;
  – Saltwater disposal either in a Brine Sink within the Sea Bed or outside of the Sea Bed; and
  – Pupfish connectivity between the drains and/or creeks could occur in the Partial Sea, depending upon the location of the water. If a drain or creek does not enter the Partial Sea, then a separate water body could be provided to connect the drains and/or creeks;

• **Shallow Saline Habitat Concepts**
  – Construct cells on the Sea Bed with multiple berms to maintain waters with varying depths and salinities to represent habitat functions and values of shoreline, estuarine, and marine sea areas. For example, salinity in some cells could range from 20,000 to 60,000 mg/L, and salinity of other cells could range from 60,000 to 200,000 mg/L;
  – Saltwater disposal either in a Brine Sink within the Sea Bed or outside of the Sea Bed; and
  – Pupfish connectivity between the drains and/or creeks could occur in the Shallow Saline Habitats depending upon the locations of the cells and the adjacent drains or creeks. If a drain or creek does not enter the Shallow Saline Habitat, then a separate water body could be provided to connect the drains and/or creeks;

• **Saltwater Disposal Concepts**
  – Evaporation pond within the Sea Bed;
  – Evaporation ponds outside of the Sea Bed, including use of dry lake beds;
  – Groundwater injection to deep aquifers; and
  – Export to the Gulf of California or Pacific Ocean.

**Whole Sea Concepts**
The Whole Sea concepts would require an imported water supply to replace the water that evaporates. If saltwater is removed from the Whole Sea to maintain a marine salinity, imported water would have increase to replace the saltwater removed from the Whole Sea.

Several water supply options were considered, including diversion of water from the Colorado River, Gulf of California, Pacific Ocean, and recycled wastewater. These options are summarized below.
Import Water from the Colorado River

This concept has been considered in previous studies. The water would be acquired from the lower Colorado River within the United States and conveyed to the Whole Sea through the New and Alamo rivers and/or Imperial Irrigation District (IID) canals. Saltwater would need to be removed from the Whole Sea if salinity was stabilized at 30,000 to 40,000 mg/L. Less imported water would be required if the salinity was not stabilized. The total amount of water to be imported would be equal to the amount of water that would evaporate plus the saltwater removed, if any, as shown in Table 2-1. The amount of imported water presented in Table 2-1 assumes inflows described under the No Action Alternative conditions after reductions that occur after 2017.

### Table 2-1

<table>
<thead>
<tr>
<th>Inflow Assumptions from Salton Sea Watershed</th>
<th>Salinity Control</th>
<th>Whole Sea Salinity in 2078</th>
<th>Inflow Imported from Colorado River</th>
<th>Evaporation Ponds</th>
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</thead>
<tbody>
<tr>
<td>Per No Action Alternative-CEQA Conditions</td>
<td>Yes</td>
<td>30,000 to 40,000 mg/L</td>
<td>428,000 acre-feet/year after 2017</td>
<td>15,600 acres</td>
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<tr>
<td></td>
<td>No</td>
<td>77,000 mg/L</td>
<td>341,000 acre-feet/year after 2017</td>
<td>Not needed</td>
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<tr>
<td>Per No Action Alternative-Variability Conditions</td>
<td>Yes</td>
<td>30,000 to 40,000 mg/L</td>
<td>721,000 acre-feet/year after 2017</td>
<td>14,700 acres</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>74,000 mg/L</td>
<td>634,000 acre-feet/year after 2017</td>
<td>Not needed</td>
</tr>
</tbody>
</table>

All values assume Whole Sea surface water elevation of -230 feet msl.

If salinity is managed for a range of 30,000 to 40,000 mg/L, saltwater disposal would be required. Saltwater disposal concepts are described below, including evaporation ponds. Table 2-1 includes the surface area that would be required for evaporation ponds, however, other methods also could be used.

This concept would require surplus water that could be purchased and conveyed to the Whole Sea, and a change in authorized uses of Colorado River water for fish and wildlife uses. The use of Colorado River water is governed by a complex assortment of federal and state laws, interstate compacts, an international treaty, court decisions, federal contracts, federal and state regulations, and multi-party agreements which together are commonly referred to as the Law of the River. In 1928, Congress enacted the Boulder Canyon Project Act, which authorized the Secretary of the Interior to construct Hoover Dam and other facilities, and to contract for the delivery and use of water from these facilities for irrigation and domestic uses. In 1964, the Supreme Court of the United States issued Arizona v. California, apportioning lower Colorado River water controlled by the United States to the states of Arizona, California, and Nevada. The Colorado River Basin Project Act of 1968 provided for a wider range of uses of Colorado River water for some users, including improving conditions for fish and wildlife. However, the expansion of authorized uses did not include areas served by the All-American Canal, such as the service areas of IID and Coachella Valley Water District (CVWD). Areas served by the All-American Canal only can use Colorado River water for irrigation and domestic uses. Under the Decree, the Secretary of the Interior is required to determine when normal, surplus, and shortage conditions occur on the lower Colorado River. Specific guidelines have been established for the Secretary of the Interior to declare a surplus condition for the period of 2002 to 2016 in the Interim Surplus Guidelines. It is unknown if surplus water would become available in the future, but this is not expected to occur frequently if at all. In addition, such a surplus could not be directly delivered to the Whole Sea for the benefit of fish and wildlife since this use is not authorized for areas served by the All-American Canal.
This concept also would require agreements with IID to convey water to the Whole Sea from the Colorado River.

**Import Water from the Gulf of California**

Importation of water from the Gulf of California also has been considered in previous studies. This water supply would require construction of conveyance facilities from the Gulf of California to import water and construction of saltwater disposal facilities, such as evaporation ponds or conveyance facilities to the Gulf of California.

As described above for the previous Whole Sea concept, the amount of imported water would need to be adequate to replace the evaporated water and the saltwater removed to maintain salinity. To provide a Whole Sea with a stable salinity and to maintain a stable water surface elevation of -230 feet msl, about 3,400,000 acre-feet/year would need to be imported and 2,730,000 acre-feet/year would need to be removed. The amount of imported water would be based upon the salinity of the Gulf of California and the Whole Sea when the conveyance facilities become operational. The facilities probably would not be designed, permitted, and constructed before 2020. At that time, the salinity of the Whole Sea would be 76,000 mg/L. The Gulf of California salinity ranges from 37,000 to 39,000 mg/L. Because the Gulf of California water salinity is relatively high, the projected salinity of the Whole Sea would be 44,000 mg/L in 2078. This salinity is greater than marine water salinity and would not support the defined habitat objectives described in previous sections of this chapter. These flows are almost 40 times higher than flows described above for importation of Colorado River because more water with salinity of 37,000 to 39,000 mg/L would be required to dilute the Whole Sea salinity than Colorado River water with salinity of 500 to 1,500 mg/L.

In 1993, Mexico identified the Upper Gulf of California to be a Biosphere Reserve (Brusca et al, 2001). In 1995, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Man and Biosphere Program (MAB) designated the Upper Gulf of California/Colorado River Delta as a Biosphere Reserve to reduce biodiversity loss, improve links between cultural and biological diversity, and provide environmental sustainable conditions around the reserve. More specifically, the designation by Mexico protected fisheries in the Upper Gulf of California. In 2005, UNESCO designated areas of the Gulf of California as a World Heritage Site, including the Upper Gulf of California/Colorado River Delta Biosphere Reserve Islands of the Gulf of California, Isla San Pedro Martir, El Vizcaino Biosphere Reserve, Bahia de Loreto National Park, Cabo Pulmo National Marine Park, Cabo San Lucas, Islas Marias Biosphere Reserve, and Isla Isabel National Park (UNESCO, 2005). This designation is to encourage preservation of natural and cultural heritage.

Construction and operations and maintenance of water diversion and conveyance facilities for an alternative to Import Water from the Gulf of California would require compliance with water rights, water quality, and environmental regulations in Mexico. To protect the Biosphere Reserve, the conveyance facilities would need to extend to the lower portion of the Gulf of California. This would result in longer conveyance facilities than have been evaluated in previous studies.

Water diverted from the Gulf of California would need water treatment prior to discharge into the Whole Sea to reduce the risk of introduction of new organisms or constituents.

**Import Water from the Pacific Ocean**

Importation of water from the Pacific Ocean is similar in concept to importation of water from the Gulf of California. The salinity of the Pacific Ocean along the San Diego County coastline ranges from 33,000 to 35,000 mg/L. To provide a Whole Sea with a stable salinity and stable water surface elevation of -230 feet msl, about 3,400,000 acre-feet/year would be imported and 2,730,000 acre-feet/year would be removed. The salinity would stabilize at about 40,000 mg/L.
Diversion of water from the Pacific Ocean would require compliance with provisions of the State Water Resources Control Board, State Lands Commission, California Coastal Conservancy, California Coastal Commission, Department of Fish and Game (DFG), U.S. Environmental Protection Agency, and potentially others. These regulatory agencies require that facilities avoid adverse impacts to physical and biological resources, especially the aquatic habitat. Recent evaluations for water supply diversion facilities along the Pacific Ocean coast have required substantial mitigation measures to avoid impacts to benthic organisms and water quality.

The primary locations considered in previous studies for diversion of water from the Pacific Ocean were along the San Diego County coast. There are extensive portions of the San Diego County coast that are protected in preserves, including:

- Buena Vista Lagoon State Ecological Reserve and proposed Agua Hedionda Lagoon State Ecological Reserve located near Encinitas;
- Batiquitos Lagoon and San Elijo Lagoon Ecological Reserve located north of Del Mar;
- Mission Bay Preserve;
- San Diego National Wildlife Refuge and Sweetwater Marsh National Wildlife Refuge near San Diego; and
- Tijuana River National Estuarine Research Reserve and Tijuana Slough National Wildlife Refuge along the southern San Diego County coastline.

To avoid these areas, the intake probably would be located near Camp Pendleton in northern San Diego County. Portions of Camp Pendleton include habitats occupied by endangered or threatened species. However, at this time, there are no protected ocean areas along the coastline adjacent to Camp Pendleton.

Conveyance facilities would extend from the Imperial and Coachella valleys to the Pacific Ocean. Several routes evaluated in previous studies paralleled Interstate 10 and State Highway 78.

Water diverted from the Pacific Ocean would need to undergo water treatment prior to discharge into the Whole Sea. This would reduce the risk of introduction of new organisms or constituents from the ocean.

**Import Recycled Wastewater from Riverside and San Bernardino Counties**

Currently, wastewater effluent from the Imperial and Coachella valleys flows into the Salton Sea. Additional wastewater effluent could be conveyed from communities in western Riverside and San Bernardino counties. The required amount of water would be similar to that described under the Import Water from the Colorado River concept and could range from 428,000 to 721,000 acre-feet/year to provide a stable salinity of 30,000 to 40,000 mg/L depending upon the amount of inflow.

Existing wastewater flows from western Riverside and San Bernardino counties are about 340,000 acre-feet/year. It is projected that future wastewater flows from this area could be 500,000 acre-feet/year by 2040 (Reclamation, 2004). Many of the communities already recycle wastewater effluent. It is anticipated that by 2040, more than 50 percent of the wastewater effluent would be recycled in the local communities. In addition, the water and wastewater agencies are pursuing rigorous water conservation efforts that could further reduce wastewater flows. Therefore, the available recycled water flows for the Whole Sea may be less than the 428,000 to 721,000 acre-feet/year of needed imported water. Transfer of the water to the Whole Sea could only occur if there were no adverse impacts on communities that use the wastewater effluent.
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The wastewater treatment facilities are located relatively uniformly over Riverside and San Bernardino counties. Therefore, effluent would need to be collected from all of the treatment plants and conveyed to one location for subsequent conveyance to the Whole Sea.

Partial Sea Concepts
The Partial Sea concepts would include a water body with salinity ranging from 20,000 to 40,000 mg/L. This water body would be located in only part of the Sea Bed and would be formed by one or more barriers. Previous studies have evaluated locations of the Partial Sea in the northern and southern portions of the Sea Bed. The size of the Partial Sea varied depending upon inflows and inflow reliability, location of barriers or dams that form the Partial Sea, and other uses of inflows.

Saltwater disposal would be required to maintain the specified salinity in the Partial Sea. The saltwater disposal site could be located within or outside of the Sea Bed.

This concept would result in Exposed Playa on a portion of the Sea Bed. As described above, one of the objectives would be to manage air quality issues in each of the alternatives. Therefore, the Partial Sea concepts would require Air Quality Management of Exposed Playa that is not overlain by water or other facilities.

During the initial phases of the PEIR preparation, several Partial Sea concepts were developed. Previously, the Salton Sea Authority had developed a concept that included a Partial Sea in the northern, western, and southern portions of the Sea Bed. Concurrently with the preparation of the PEIR, the Salton Sea Authority continued to refine this concept. At the same time, the Imperial Group developed a concept that would include one or more concentric berms parallel to the shoreline to contain several Partial Sea water bodies.

Shallow Saline Habitat Concepts
The Shallow Saline Habitat concepts would include shallow water bodies with salinity ranging from 20,000 to 200,000 mg/L. The water bodies would be located on part of the Sea Bed and would be formed by low-height berms. Initially, it was discussed that the salinity in this habitat could be less than 20,000 mg/L. However, during the preparation of the PEIR, it was determined that salinity less than 20,000 mg/L could lead to a high potential for freshwater mosquitos, excessive growth of vegetation that would require a high maintenance effort, increased selenium ecorisk, and inability to support marine sport fish that have been present in the Salton Sea in recent years, as described in Appendix H-1. Salinity of 20,000 to 200,000 mg/L would reduce these risks and support fish and wildlife that have been present in recent years.

The Shallow Saline Habitats could be constructed to contain a wide range of water bodies with different depths, salinity, or habitat features such as islands or snags. The focus of these concepts would be to minimize the infrastructure to provide habitat functions and values. These areas are referred to as Saline Habitat Complex areas. The size of the Saline Habitat Complex area would vary depending upon inflows, inflow reliability, and availability of land that could provide shallow water. Therefore, Saline Habitat Complex could not be located on steep slopes because the amount of shallow water would be limited or not available.

This concept is currently being evaluated by the U.S. Department of the Interior, Geological Survey as a pilot project on the southeastern Salton Sea shoreline. The water bodies could be similar to managed brackish water habitats that are developed in the San Joaquin Valley to support large bird populations amongst the agricultural fields.

Saltwater disposal would be required to maintain specified salinity in the Saline Habitat Complex cells. The saltwater disposal site could be located within or outside of the Sea Bed. However, because this
concept was developed to minimize infrastructure, it is assumed that the saltwater disposal site would be located within the Sea Bed.

This concept would result in Exposed Playa on a portion of the Sea Bed. As described above, one of the objectives would be to manage air quality issues in each of the alternatives. Therefore, the Shallow Saline Habitat concept would require Air Quality Management of Exposed Playa that is not overlain by water or other facilities.

**Saltwater Disposal Concepts**

To maintain salinity for the Whole Sea, Partial Sea, and/or Shallow Saline Habitat concepts, a portion of the water containing salts would need to be diverted from the water bodies for disposal. If salt disposal does not occur, the salinity would continue to increase in the water bodies.

**Evaporation Ponds Within the Sea Bed**

Under the Partial Sea and Shallow Saline Habitat concepts, only a portion of the Sea Bed would be used for the managed habitats and water bodies. All or a portion of the remaining area could be used as an evaporation pond for the disposal of saltwater diverted from the Partial Sea or Shallow Saline Habitats. The evaporation pond, or Brine Sink, would be characterized by salinity of more than 40,000 mg/L and would become more saline over time as the salts accumulate and the water evaporates. Salinity in the Brine Sink would exceed 350,000 mg/L by 2078 in some concepts.

To minimize infrastructure and related maintenance issues, saltwater would flow by gravity to the Brine Sink that would be located at the lowest elevations in the Sea Bed. The size of the Brine Sink would be different in each concept.

**Evaporation Ponds Outside the Sea Bed**

Under the Whole Sea and Partial Sea concepts, saltwater could be diverted into an evaporation pond located outside of the Sea Bed. The evaporation pond would function in a similar manner as described above for evaporation ponds within the Sea Bed.

The evaporation pond outside of the Sea Bed would require conveyance facilities that would pump water from the Whole Sea and Partial Sea in a canal or pipeline to the evaporation ponds. Evaporation pond locations identified and evaluated in previous studies have ranged from areas adjacent to the Salton Sea to dry lake beds in neighboring watersheds.

Typically, evaporation ponds used for wastewater disposal are constructed with berms at least 5 feet high and bottom slopes of less than 2 percent. The size of the evaporation ponds could range from 25 acres for small Partial Seas to over 450,000 acres for Whole Seas, depending upon the amount of saltwater and the height of the berms. The evaporation ponds must be constructed with soils that are relatively impermeable to protect adjacent land uses and groundwater. Therefore, it could be necessary to import soils if the local soils are permeable due to high concentrations of sand and/or other coarse grained materials. Previous studies have evaluated the use of enhanced evaporative systems to reduce the size of the evaporation ponds. However, the results of those studies indicated that the operations and maintenance efforts would be extensive (Salton Sea Authority et. al., 1997; Reclamation, 2004).

**Evaporation Pond Sites Near the Sea Bed**

Potential evaporation pond locations adjacent to the Sea Bed could be limited due to existing land uses. On the western and eastern shorelines, the land is either within communities, owned by the federal government, or characterized by slopes greater than 5 percent. On the northern shoreline, the land is either within communities or part of the Torres Martinez Tribal Lands. Agricultural lands along the southern
shoreline would require conversion of agricultural land, including lands that are considered to be Prime Farmland or Farmland of Statewide Importance.

**Evaporation Pond Sites at Dry Lake Beds**

Evaporation ponds located at dry lake beds were evaluated in previous studies for Palen, Clark, and Ford lakes (Salton Sea Authority et. al., 1997). All three sites would require extensive conveyance and pumping because the lake beds are located at elevations above mean sea level. Use of these dry lakes probably would be limited due to habitat protection requirements at the site or along the conveyance route.

Palen Dry Lake and Ford Dry Lake are located in Riverside County along Interstate 10 near Desert Center. Both areas have been recently closed to livestock grazing by the U.S. Department of the Interior, Bureau of Land Management (BLM) in compliance with a 2005 Biological Opinion for the California Desert Conservation Area Plan to promote the conservation of desert bighorn sheep (Service, 2005). The BLM also closed playas and sand dunes at Palen Dry Lake, Palen Dry Lake Dunes, Ford Dry Lake, and Ford Dry Lake Dunes to vehicle use to protect desert tortoise non-critical habitat. Palen Dry Lake and Ford Dry Lake also provide habitat for the Mojave fringe-toed lizard, a species of concern. These habitat issues would probably preclude flooding of the lake beds for evaporation ponds.

Clark Dry Lake is located in San Diego County near Anza-Borrego Desert State Park and is smaller than Palen and Ford lakes. This area does not have a specific habitat designation but use of it would include conveyance routes across the State Park.

**Groundwater Injection to Deep Aquifers**

Saltwater from the Salton Sea could not be discharged or injected into the upper aquifers that are used for potable and agricultural water supplies due to the high salinity. Previous studies have evaluated injection of groundwater into the very deep aquifers in the same manner as the re-injection of brine flows from the geothermal power plants. The power plants re-inject the brine from steam into wells that are over one mile deep. Previous studies have indicated that the geological formations near the Salton Sea may not have adequate permeability to accept flows from the Salton Sea (Salton Sea Authority et. al., 1997). In addition, the geothermal development balances the withdrawal of steam with the injection of brine to avoid cooling the high temperatures in the geothermal field. Previous studies have indicated that it is not known if injection of additional saltwater could cause cooling of the geothermal field (Salton Sea Authority et. al., 1997). However, a pilot study is planned by Reclamation to investigate this.

**Export to the Gulf of California or Pacific Ocean**

Export of saltwater to the Gulf of California or Pacific Ocean would require conveyance and compliance with water quality requirements similar to those described under the Whole Sea concepts.

Discharge of the water to the Gulf of California would require compliance with water rights, water quality, and environmental regulations in Mexico, including protections under UNESCO. In addition, the water discharged to the Gulf of California would need to undergo treatment to prevent contamination by new organisms and water quality constituents.

Discharge to the Pacific Ocean would require compliance with provisions of the State Water Resources Control Board, State Lands Commission, California Coastal Conservancy, California Coastal Commission, DFG, U.S. Environmental Protection Agency, and potentially others. These regulatory agencies require that facilities avoid adverse impacts to physical and biological resources, especially the aquatic habitat. Recent evaluations on existing and projected outfalls along the Pacific Ocean coast have required substantial mitigation measures to avoid impacts to benthic organisms and water quality conditions including very long outfalls to avoid impacts to the shoreline.
Application of Broad Screening Criteria to Range of Concepts

Broad screening criteria were identified as compliance with legislation and regulatory requirements, and technical feasibility based upon preliminary analyses. The results of the application of the broad screening criteria are presented in Table 2-2.

<table>
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<tr>
<th>Concept</th>
<th>Comments</th>
<th>Screening Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Sea Concept - Import Water from the Colorado River</td>
<td>Under the Law of the River, water could not be used for fish and wildlife purposes in the Salton Sea. In addition, surplus water is not likely to be available in the future.</td>
<td>Eliminated from further analysis.</td>
</tr>
<tr>
<td>Whole Sea Concept - Import Water from the Gulf of California</td>
<td>This concept would require: 1) compliance with water quality and environmental protection regulations adopted by the United States, California, and Mexico; and 2) agreements between the United States and Mexico for construction and operations and maintenance of facilities in Mexico. This concept does not appear to meet the broad screening criteria based upon regulatory requirements. However, this alternative was identified during Scoping and Public Outreach meetings as an alternative that the public wanted to be considered in more detail in Step 4.</td>
<td>To be considered in more detail.</td>
</tr>
<tr>
<td>Whole Sea Concept - Import Water from the Pacific Ocean</td>
<td>This concept would require compliance with water quality and environmental protection regulations adopted by the United States and California. Due to environmentally protected areas along the San Diego County coast, the most appropriate area for an intake may be near Camp Pendleton. This concept does not appear to meet the broad screening criteria based upon regulatory requirements. However, this alternative was identified during Scoping and Public Outreach meetings as an alternative that the public wanted to be considered in more detail in Step 4.</td>
<td>To be considered in more detail with an outfall near Camp Pendleton.</td>
</tr>
<tr>
<td>Whole Sea Concept - Recycle Wastewater from Riverside and San Bernardino Counties</td>
<td>The amount of water available from recycled wastewater in western Riverside County and San Bernardino County is projected to not be adequate for the Whole Sea Concept. Therefore, this alternative is considered not to be technically feasible.</td>
<td>Eliminated from further analysis.</td>
</tr>
<tr>
<td>Partial Sea Concept</td>
<td>This concept appears to be technically feasible based upon analysis in Step 3.</td>
<td>To be considered in more detail.</td>
</tr>
<tr>
<td>Shallow Saline Habitat Concept (Saline Habitat Complex)</td>
<td>This concept appears to be technically feasible based upon analysis in Step 3.</td>
<td>To be considered in more detail.</td>
</tr>
<tr>
<td>Saltwater Disposal Concept - Evaporation Ponds (Brine Sink) within the Sea Bed</td>
<td>This concept appears to be technically feasible based upon analysis in Step 3. Could not be used with Whole Sea concepts.</td>
<td>To be considered in more detail with Partial Sea and Shallow Saline Habitat configurations.</td>
</tr>
<tr>
<td>Concept</td>
<td>Comments</td>
<td>Screening Results</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>Saltwater Disposal Concept - Evaporation Ponds outside the Sea Bed - Adjacent to the Salton Sea</td>
<td>This concept would require acquisition of more than 100 acres, probably of agricultural land.</td>
<td>This concept could be developed in accordance with regulations along the southern shoreline. However, the availability of the land is not certain at this time and could reduce lands designated as Prime Farmland or Farmland of Statewide Importance. This area could be used for Whole Sea concepts. However, the only Whole Sea concepts considered for further analysis involve importation of water from the Gulf of California or Pacific Ocean. These concepts could more easily incorporate export facilities than Evaporation Ponds along the southern shoreline. Therefore, this saltwater disposal concept was eliminated from further analysis for the Whole Sea concepts. For the Partial Sea and Shallow Saline Habitat concepts, use of Evaporation Ponds outside the Sea Bed would require more infrastructure; land acquisition, as described above; and an increased need for Air Quality Management on Exposed Playa on the Sea Bed. Therefore, this saltwater disposal concept was eliminated from further analysis for the Partial Sea and Shallow Saline Habitat concepts.</td>
</tr>
</tbody>
</table>
Table 2-2

Results of the Application of Broad Screening Criteria to Range of Concepts

<table>
<thead>
<tr>
<th>Concept</th>
<th>Comments</th>
<th>Screening Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saltwater Disposal Concept - Evaporation Ponds outside the Sea Bed at Dry Lakes</td>
<td>Palen Dry Lake and Ford Dry Lake have been designated for the protection of threatened or endangered species and conveyance facilities to use Clark Dry Lake would need to cross areas that may be subject to environmental protections.</td>
<td>This concept could be developed in accordance with regulations assuming that the potential impacts to threatened and endangered species could be mitigated. This area could be used for Whole Sea concepts. However, the only Whole Sea concepts considered for further analysis involve importation of water from the Gulf of California or Pacific Ocean. These concepts could more easily incorporate export facilities than Evaporation Ponds outside the Sea Bed. Therefore, this saltwater disposal concept was eliminated from further analysis for the Whole Sea concepts. For the Partial Sea and Shallow Saline Habitat concepts, use of Evaporation Ponds outside the Sea Bed would require more infrastructure; land acquisition, as described above; and an increased need for Air Quality Management on Exposed Playa on the Sea Bed. Therefore, this saltwater disposal concept was eliminated from further analysis for the Partial Sea and Shallow Saline Habitat concepts.</td>
</tr>
<tr>
<td>Saltwater Disposal Concept - Groundwater Injection</td>
<td>Previous studies have indicated that geologic formations near the Salton Sea may not have the appropriate permeability to be used for extensive groundwater injection of saltwater. In addition, it is not known if this action would cause cooling of the geothermal fields.</td>
<td>Eliminated from further analysis. If proposed pilot studies indicate that this concept is feasible, groundwater injection could be analyzed in project-level analyses.</td>
</tr>
<tr>
<td>Saltwater Disposal Concept - Export to the Gulf of California or Pacific Ocean</td>
<td>Saltwater disposal in the Gulf of California would require compliance with water quality and environmental protection regulations adopted by the United States, California, and Mexico, and agreements between the United States and Mexico. Saltwater disposal in the Pacific Ocean would require compliance with water quality and environmental protection regulations adopted by the United States and California.</td>
<td>This concept would most appropriately be used in conjunction with Whole Sea concepts using Importation of Water from the Gulf of California or Pacific Ocean. For the Partial Sea concept, this saltwater disposal concept would increase the amount of infrastructure as well as the complexity of construction and operations and maintenance. To be considered in more detail with the Whole Sea concepts that Import Water from the Gulf of California and/or Pacific Ocean.</td>
</tr>
</tbody>
</table>
Step 4: Development of Configurations

Concepts that were retained for further analysis following application of broad screening criteria were defined in more detail and are referred to as configurations. The detailed descriptions were presented to the Salton Sea Advisory Committee, Working Groups, and the public in a series of meetings. Screening criteria based upon the requirements of legislation, regulations, and CEQA were applied to the configurations to define the final range of alternatives.

The configurations identified in Step 3 are listed below:

- Import-Export Water from and to the Gulf of California;
- Import-Export Water from and to the Pacific Ocean;
- Partial Sea configurations with Brine Sink within the Sea Bed; and
- Saline Habitat Complex with Brine Sink within the Sea Bed.

Import-Export Water from and to the Gulf of California

The purpose of this configuration is to provide a Whole Sea configuration that maintains a stable water surface elevation at -230 feet msl and a stable salinity. Under either the No Action Alternative-CEQA Conditions or the No Action Alternative-Variability Conditions, the amount of inflows are not adequate to maintain a Whole Sea at a water surface elevation of -230 feet msl without imported water. To provide a stable water surface elevation and stable salinity, about 3,400,000 acre-feet/year of water would need to be imported and about 2,700,000 acre-feet/year of saltwater would need to be exported for inflows described under the No Action Alternative-Variability Conditions. This large amount of water would be required to provide a salinity of 44,000 mg/L in the Whole Sea. It is not possible to reduce the salinity further due to the water quality in the Gulf of California, as described above under the Whole Sea concept.

The following subsections describe the conveyance and treatment requirements for the Import-Export from and to the Gulf of California.

Conveyance Facilities

This configuration would include the construction of multiple pipelines and/or canals and pumping plants to convey water. Conveyance facilities between the Whole Sea and the Gulf of California could be located along several routes described in previous studies. Inlet and outlet structures would need to be separated by a significant distance to prevent export water from being recycled into the inlet structures. The structures could be located on opposite sides of the Gulf of California or be separated by several miles. For the purposes of this configuration, it is assumed that the structures would be located on the same side of the Gulf of California to minimize impacts to the environment and communities from construction of the conveyance facilities.

Routes evaluated in previous studies were considered for this configuration. One route would be located west of the New River, cross the United States-Mexico border west of Calexico-Mexicali, continue along a route between Laguna Salada and Highway 5, and connect to the Gulf of California south of the Biosphere Reserve near San Felipe (Reclamation, 1998). This route would be about 178 miles in length. Another route considered in the same study would continue along the eastern shoreline of the upper portions of the Gulf of California to the El Golfo de Santa Clara and would be about 218 miles in length. Both routes would include a combination of canals in areas with gravity flows and pipelines for pressurized flows to convey the water over the pass in the Sierra Cucapa Mountains for both import and export facilities and from the low elevations of the Salton Sea for the export facilities. To import water from the Gulf of California to the Salton Sea using the western route, the following conveyance facilities would be required: up to four pumping plants with capacities of 4,700 cubic feet/second if the pumps operated 24 hours/day, 74 miles of eight pipelines with outside diameters of about 15 feet, and 104 miles...
Chapter 2
Development of Alternatives

of a large canal. To export water from the Whole Sea to the Gulf of California using the western route, the following facilities would be required: up to five pumping plants with capacities of 3,800 cubic feet/second, 74 miles of six pipelines with outside diameters of about 15 feet, and 104 miles of canals with water depths and widths of about 10 feet and 100 feet, respectively.

A recent news release of a study described construction of a canal between San Felipe and Laguna Salada to extend the waters of the Gulf of California into Laguna Salada as part of a power generation project called the Montague Tidal Project (Proyecto Nacional Mexico Tercer Milenio, 2004). A similar concept was described in previous studies (Salton Sea Authority et. al., 1997). Laguna Salada is located at an approximate elevation of -33 feet msl. Use of Laguna Salada as part of the canal either would require construction of barriers around the basin to contain the saltwater or flooding of the basin to an elevation of 0 feet msl. The news release also described extension of a canal to Mexicali which is located at an elevation of 72 feet msl. If the canal is used for water conveyance, there would need to be at least one pumping plant to raise the water. If the canal is used for a ship channel, there would need to be at least one set of locks. If this facility was constructed, it could also be used to convey water into Imperial County near Calexico. A canal could extend from Calexico to the Salton Sea. The canal would need to be at least 10 feet deep and 100 feet wide to import water into the Salton Sea. A separate canal would need to be constructed from the Salton Sea to the Gulf of California for export of saltwater. The export water could not be discharged near the inlet of the channel that connected the Gulf of California to Laguna Salada to avoid recycling of high salinity water from the Salton Sea. Therefore, the export conveyance would probably consist of both pipelines and a canal, as described above.

All conveyance routes would require agreements with Mexico and local agencies in Mexico to provide access for construction and operations and maintenance of the facilities. If the routes would be located along sensitive environmental corridors, mitigation measures could be required, such as restoration of several times the amount of disturbed land to protect sustainable environments. Methods that would be used to develop mitigation measures in Mexico were not determined at the time of the preparation of the PEIR.

Power would be required in both the United States and Mexico for the pumping facilities. However, some electrical power needs could be recovered by hydropower generators located along the conveyance channels.

Inlets would be constructed with fish protection structures to avoid entraining and entrapping fish and other organisms. Inlet structures of over a mile in length probably would be required to divert about 9,200 acre-feet/day (3 billion gallons/day).

Outlet structures would be constructed with diffusers to provide adequate dilution and mixing. These structures would also be over a mile in length with capacities of about 7,700 acre-feet/day (2.5 billion gallons/day).

Treatment Facilities

Water treatment facilities would be required for both import and export flows to avoid introduction of new species into either the Gulf of California or the Salton Sea. The purpose of the treatment facilities would be to remove organisms and nutrients from the water without changing the salinity. Secondary wastewater treatment facilities could be used to achieve these water quality goals. The water treatment facilities could be located near the Sea or in southern Imperial County near the United States-Mexico border to allow operations and maintenance activities to occur within the United States. The capacity of the treatment facilities would be 9,200 acre-feet/day (3 billion gallons/day) for the import water and 7,700 acre-feet/day (2.5 billion gallons/day) for the export water. Additional facilities would be required for disposal of the materials and organisms removed from the water.
**Habitat Benefits of the Whole Sea**

Salinity in the Whole Sea under this configuration would be similar to Existing Conditions because the stabilized salinity would be 44,000 mg/L. There would be estuarine conditions near the confluences of the New, Alamo, and Whitewater rivers.

Under Existing Conditions, desert pupfish can move between the drains and creeks in the Salton Sea. Under the Whole Sea configurations, this type of desert pupfish connectivity would continue.

The inlet and outlet structures would be designed to minimize or eliminate adverse impacts to the environment in the Gulf of California and in the Whole Sea. The conveyance facilities also would be designed with appropriate mitigation measures, such as restoration of mitigation lands, to minimize or eliminate adverse impacts to the environment.

**Air Quality Management**

Construction activities along the conveyance corridor would require air quality management measures to reduce dust and emissions from vehicles. However, it is anticipated that these impacts could not be fully mitigated with existing or foreseeable technology.

This Whole Sea configuration would reduce the amount of Exposed Playa in the Sea Bed. The water surface elevation would be at -230 feet msl under this configuration. Therefore, the amount of Exposed Playa would be limited to a relatively narrow strip of land along the shoreline.

**Import-Export Water from and to the Pacific Ocean**

The purpose and capacities of this configuration would be identical to those described under the Import-Export from and to the Gulf of California configuration. The following subsections describe the conveyance and treatment requirements for the Import-Export from and to the Pacific Ocean.

**Conveyance Facilities**

As described above under the Import from the Pacific Ocean concept, numerous areas with environmental protections are located along the San Diego County shoreline of the Pacific Ocean. These environmental protections would limit or preclude construction and operations of inlet/outlet structures that divert 9,200 acre-feet/day (3 billion gallons/day) and discharge 7,700 acre-feet/day (2.5 billion gallons/day). At this time, extensive shoreline environmental protections have not been identified in the ocean near Camp Pendleton. Therefore, for the purposes of this PEIR, it is assumed that the location of the inlet and outlet structures under this configuration could be located near Camp Pendleton. However, future environmental studies may preclude use of this area for import-export facilities.

Conveyance facilities between the Whole Sea and Camp Pendleton could be located along several routes as described in previous studies. One route that was evaluated in a previous study would be located parallel to State Highway 78 (Salton Sea Authority et. al., 1997; Reclamation, 1998). Another route that was evaluated was parallel to State Highways 22 and 76. These routes would range from about 100 to 130 miles in length and would need to raise the water elevation to 3,500 feet msl. Tunnels would be used along a large portion of the route to reduce the amount of pumping. Pipelines would be used in areas with pressurized flow. Canals could be used in areas with gravity flow. However, the gravity flow would exist in western San Diego County where land uses are limited due to existing communities or environmental protections.

Facilities to be constructed in San Diego County would need to comply with the county habitat conservation programs. The route that parallels State Highway 76 would cross several areas owned by various Indian tribes and would require approvals from those nations. Both routes would cross the Cleveland National Forest and require federal permits.
Power would be required for the pumping facilities. However, some electrical power needs could be recovered by hydropower generators located along the conveyance channels.

Inlet and outlet structures would need to be separated by a significant distance to prevent export water from being recycled into the inlet structures. These structures would need to be constructed and operated in accordance with the requirements of DFG, California Coastal Commission, possibly State Lands Commission, federal government, and possibly other agencies, if the facilities were located in Camp Pendleton or the intake and outlet operations affected the shoreline lands in Camp Pendleton.

Inlets would be constructed with fish protection structures to avoid entraining and entrapping fish and other organisms. Inlet structures of over a mile in length probably would be required. Outlet structures would be constructed with diffusers to provide adequate dilution and mixing. These structures would also be over a mile in length.

Recently, several proposals have been initiated for desalination facilities along the Southern California coastline. Environmental protections being considered for these facilities are assumed to be required for this configuration. However, the desalination facilities being considered are only 1 to 2 percent of the size of the facilities in this configuration. Therefore, it is not known what the environmental requirements or limitations would be for this type of facility.

**Treatment Facilities**

Water treatment facilities would be required for both import and export flows to avoid introduction of species into either the Pacific Ocean or the Salton Sea. The purpose of the treatment facilities would be to remove organisms and nutrients from the water without changing the salinity. Secondary wastewater treatment facilities could be used to achieve these water quality goals. However, to meet the discharge requirements, advanced treatment may be required to protect beneficial uses along the San Diego County shoreline.

The water treatment facilities could be located near the Sea or in San Diego County near the Pacific Ocean. The capacity of the treatment facilities would be 9,200 acre-feet/day (3 billion gallons/day) for the import water and 7,700 acre-feet/day (2.5 billion gallons/day) for the export water. Additional facilities would be required for disposal of the materials and organisms removed from the water.

**Habitat Benefits of the Whole Sea**

Salinity in the Whole Sea under this configuration would be similar to Existing Conditions because the stabilized salinity would be 40,000 mg/L. There would be estuarine conditions near the confluences of the New, Alamo, and Whitewater rivers.

Under Existing Conditions, desert pupfish can move between the drains and creeks in the Salton Sea. Under the Whole Sea configurations, this type of desert pupfish connectivity would continue.

The inlet and outlet structures would be designed to minimize or eliminate adverse impacts to the environment in the Pacific Ocean. The conveyance facilities also would be designed with appropriate mitigation measures, such as restoration of mitigation lands, to minimize or eliminate adverse impacts to the environment.

**Air Quality Management**

Construction activities along the conveyance corridor would require air quality management mitigation measures to reduce dust and emissions from vehicles. However, it is anticipated that these impacts could not be fully mitigated with existing or foreseeable technology.
This Whole Sea configuration would reduce the amount of Exposed Playa in the Sea Bed. The water surface elevation would be at -230 feet msl under this configuration. Therefore, the amount of Exposed Playa would be limited to a relatively narrow strip of land along the shoreline.

**Partial Sea Configurations with Brine Sink within the Sea Bed**

The purposes of the Partial Sea configurations are to maintain a stable water surface elevation at -230 feet msl and a stable salinity of 30,000 to 40,000 mg/L. The Partial Sea configurations would include at least a Partial Sea, Brine Sink in the Sea Bed for disposal of saltwater, Air Quality Management components to provide dust control on Exposed Playa, and Sedimentation/Distribution Basins to remove silt from the inflows prior to diversion of the water into conveyance facilities. Considerations for each of these components are briefly described below. Additional information is provided in Appendix H-6.

**Partial Sea Component**

The Partial Sea would be formed by a Barrier or Perimeter Dikes. A Barrier is a dam that impounds water, usually with depths of greater than 10 feet at the toe of the Barrier. A Perimeter Dike is a structure that impounds water, usually with water depths of 6 to 10 feet at the toe of the Perimeter Dike.

The majority of inflows would be conveyed into the Partial Sea in a canal-type structure. Saltwater would be removed from the Partial Sea through an outlet or spillway for conveyance to the Brine Sink. To maintain a stable elevation of -230 feet msl and a stable salinity of 30,000 to 40,000 mg/L, the flow into the Partial Sea must be monitored and maintained to replace the water lost to evaporation and diverted to the Brine Sink. The Partial Sea would be designed for an inflow pattern that would be consistent with seasonal changes in evaporation and saltwater management. During storms or when high seasonal agricultural flows occur, the additional inflows would be diverted into the Brine Sink to avoid reducing salinity in the Partial Sea below 30,000 mg/L.

**Brine Sink Component**

The Brine Sink would be located at the lowest elevation in the Sea Bed that would not be covered by the Partial Sea. Water would flow by gravity from the Partial Sea to the Brine Sink.

The Brine Sink also would receive flows from the New, Alamo, and/or Whitewater rivers and San Felipe and/or Salt creeks that would be in excess of the flows required to maintain the stable surface water elevation and salinity of the Partial Sea, as described above.

**Air Quality Management Component**

The Partial Sea configurations would include Exposed Playa in the Sea Bed that would not be covered by the Partial Sea, Brine Sink, or other facilities. The playa is currently under water and it is not possible to determine if the soils or the salts in the soils would be emissive as the water recedes. During the preparation of the PEIR, a range of methods for dust control on Exposed Playa were considered, as described in Appendix H-3. Extensive pilot studies would need to be completed as the water recedes to identify a range of methods appropriate for the local soil conditions. One of the methods for dust control in portions of Exposed Playa would use a portion of the inflows to irrigate water efficient vegetation. Use of water for Air Quality Management in this manner would reduce the available water for the Partial Sea. Therefore, the size of the Partial Sea would be reduced in relation to the areas with water efficient vegetation. Although it is not known if use of water efficient vegetation would be appropriate for dust control on the Exposed Playa, this represents a conservative approach for the purposes of the PEIR.

The Air Quality Management component would include Air Quality Management Canals to convey water to all areas of Exposed Playa, filtration systems with pumping plants, and buried drip irrigation facilities...
to provide water to the water efficient vegetation. The Air Quality Management Canals would convey brackish water with salinity less than 8,000 mg/L.

**Sedimentation/Distribution Basin Component**

The New and Alamo rivers currently contain high concentrations of silt. Recently, the CRBRWQCB adopted Sedimentation/Siltation Total Maximum Daily Loads (TMDL) for these rivers. It is assumed that these requirements would be implemented within the study period. However, there would still be silt in the inflows.

The Whitewater River also contains high concentrations of silt due to storm events in the upper watershed. However, the CRBRWQCB has not initiated development of a TMDL for silt on this river.

Silt in the inflow could be removed in the Air Quality Management Canals or canals that convey water to the Partial Sea. However, to reduce maintenance efforts and the size of the conveyance facilities, Sedimentation/Distribution Basins would be constructed where the rivers meet the Sea Bed. The Sedimentation/Distribution Basins also would serve as a diversion facility to divert water into conveyance facilities or Brine Sink.

**Balancing Water Demands in Partial Sea Configurations**

For the Partial Sea configurations, the primary objective was to maximize the size of the Partial Sea while providing adequate water supplies to Air Quality Management and additional habitat components, such as Saline Habitat Complex, if desired. To determine the size of the Partial Sea, water demands/losses of Air Quality Management, managed habitats, and Sedimentation/Distribution Basins were determined and water was reserved for these uses. If possible, water that was diverted and not lost by evaporation in the habitat components could be conveyed to the Partial Sea.

Based upon the remaining water supply, a water balance analysis was conducted for several Partial Sea configurations with a variety of water surface elevation and salinity goals. Then, a range of locations for a Barrier that extended from the east to west shorelines was evaluated to determine the ability to meet water surface elevation and salinity goals. Through meetings with the Salton Sea Advisory Committee, the public, and stakeholders, the goals of a Partial Sea configuration were confirmed to include the following objectives:

- Salinity of 30,000 to 40,000 mg/L to maintain marine sea water quality;
- Water surface elevation of -230 feet msl to maintain the shoreline as close as possible to Existing Conditions;
- Partial Sea water to be located near communities on the western and eastern shorelines, and managed wildlife and agricultural areas along the southern shoreline; and
- Ability to maintain these conditions over the long term with a high level of reliability.

These criteria were considered in the development the Partial Sea configurations in Step 4, and in the identification of the range of alternatives in Step 5.

It should be noted that these assumptions were made for the purposes of the PEIR to allow the decision makers to select an alternative that would provide an overall approach, as described in Chapter 1. During project-level analyses, salinity, elevation, or reliability factors would be developed based upon more specific information related to inflows and other assumptions.

**Locations of the Partial Sea**

Previous studies evaluated a range of Partial Sea configurations. The primary configurations evaluated in those studies were a North Sea and a South Sea with Brine Sinks in the Sea Bed (Salton Sea Authority et.
al., 1997; Reclamation, 2000). In 2004, the Salton Sea Authority identified a configuration that provided a large Partial Sea in the northern Sea Bed with extensions of the Partial Sea along the western and southern shorelines (Salton Sea Authority, 2004). Also in 2004, the Imperial Group identified a configuration that provided several narrow, concentric Partial Sea water bodies around the entire circumference of the Sea Bed.

Initially the following five Partial Sea configurations were identified:

- **North Sea -** formed by a Barrier constructed from the east to west shorelines as close to the mid-Sea position as possible with a Brine Sink located to the south of the Barrier;

- **North Sea Combined -** a North Sea formed by a Barrier from the east to west shorelines as close to the mid-Sea position as possible, a smaller water body formed by a Perimeter Dike along the western and southern shorelines to maximize the amount of shoreline with adjacent water, and a Brine Sink located to the south of the Barrier;

- **South Sea -** formed by a Barrier constructed from the east to west shorelines located south of the mid-Sea position with a Brine Sink located to the north of the Barrier;

- **South Sea Combined -** a South Sea formed by a Barrier from the east to west shorelines located south of the mid-Sea position, and a smaller water body formed by a Perimeter Dike along the western and northern shorelines to maximize the amount of shoreline with adjacent water, and a Brine Sink located to the north of the Barrier; and

- **Concentric Rings -** two concentric water bodies formed by Perimeter Dikes that would extend around the entire circumference of the shoreline to provide water adjacent to all land uses and a Brine Sink in the middle of the Sea Bed.

The Barrier and Perimeter Dike locations in these configurations were developed to provide a high reliability that the water surface elevation and salinity objectives would be achieved in at least 80 percent of the years in the 2018 to 2078 period with a conservative range of projected inflows under the No Action Alternative-Variability Conditions. The statistical analysis used to determine the design inflow criteria is described in Appendix H-2. Due to the high level of reliability, the Barrier locations would be located several miles from the mid-Sea location. Therefore, with respect to the North Sea and the South Sea configurations, water would not be adjacent to the majority of the communities along the western and eastern shorelines.

**Habitat Benefits of the Partial Sea**

The habitat benefits of the Partial Sea configurations would be located in the Partial Sea including the deep open water, shallow habitat along the shorelines, and brackish water near the New, Alamo, and Whitewater rivers confluences. The shoreline length would be less than for the current Salton Sea.

Pupfish connectivity between the drains and creeks would be modified from Existing Conditions. Water along the shoreline could provide the connectivity. However, water does not exist adjacent to all drains or creeks in each of the configurations. In areas without water adjacent to the shoreline, desert pupfish connectivity could be provided with a Pupfish Channel that connects several drains along the shoreline. In other areas, it may not be feasible to connect drains and creeks, and the desert pupfish population in these areas could become isolated.

**Treatment Facilities**

Initially, water treatment facilities were considered as part of the Partial Sea configurations. The treatment processes were primarily focused on selenium and nutrient removal. However, as the preparation of the PEIR progressed, information provided by the CRBRWQCB and others indicated that projected selenium
concentrations would not create a high ecorisk related to inflows if the water bodies in the Partial Sea configurations had a salinity of at least 20,000 mg/L, as described in Appendix F. Therefore, water treatment for selenium was eliminated from consideration for the Partial Sea configurations.

Water treatment for nutrient removal was also considered as part of these configurations. Projected nutrient concentrations due to implementation of TMDLs established by the CRBRWQCB were anticipated to reduce the need for water treatment in the Partial Sea configurations. However, to provide a range of alternatives in the PEIR, water treatment was included in one of the Partial Sea alternatives, as described in Chapter 3.

**Saline Habitat Complex Configurations with Brine Sink within the Sea Bed**

The Saline Habitat Complex configuration was developed based on the Shallow Saline Habitat concept described under Step 3. The Saline Habitat Complex configuration would provide a mosaic of shallow and deep water habitats with islands and snags that would be similar to the habitat located near the confluences of the New, Alamo, and Whitewater rivers and the Salton Sea and shallow shoreline habitat. This type of habitat has been extremely productive for both fish and wildlife at the Salton Sea, as described in Appendix H-1.

The Saline Habitat Complex configuration would include at least the Saline Habitat Complex cells, Brine Sink in the Sea Bed, Air Quality Management components, and Sedimentation/Distribution Basins. Considerations for each of these components are briefly described below.

**Saline Habitat Complex**

The Saline Habitat Complex could be located in areas that could provide relatively shallow water along the shorelines. Salinities would range from 20,000 to 200,000 mg/L to support a variety of fish and wildlife in the different cells.

The Saline Habitat Complex would be formed by Berms constructed along the contours with Sea Bed materials to provide water depths of 6 feet or less at the toe of the Berms. The Saline Habitat Complex would be divided into cells that each would be about 1,000 acres. Sea Bed material could be dredged within cells to form islands and deep holes to provide different habitats within each cell.

Salinity could vary between cells to provide a habitat mosaic, as described in Appendix H-1. Water surface elevations would be stable for each cell, but could vary between cells.

Under the Saline Habitat Complex configuration, inflows would be conveyed into the cells in canal-type structures or directly diverted from drains. Water from each cell could be diverted into other cells, a canal, or Brine Sink. The salinity of each cell would be managed by controlling flow rates into and out of the cell.

Two different methods were considered during the development of the configurations to maintain salinity of at least 20,000 mg/L. In one method, saltwater from the Brine Sink would be pumped using temporary facilities during the start-up period of some of the Saline Habitat Complex cells. This method was used with a configuration that provided a minimal amount of Saline Habitat Complex area to reduce infrastructure needs. Under this configuration, there would be 26,000 acres of open water and 12,000 acres of land used for berms and islands, with a total Saline Habitat Complex area of 38,000 acres.

In the second method, saltwater would be pumped from the Brine Sink on a long term basis and mixed with the inflows prior to diversion into the Saline Habitat Complex cells. The configuration that used this method would maximize the Saline Habitat Complex area based upon existing bathymetry. There would be 44,000 acres of open water and 21,000 acres of land used for berms and islands, with a total area of 65,000 acres.
**Brine Sink Component**
The Brine Sink component for the Saline Habitat Complex configurations would be the same as those described under the Partial Sea configurations.

**Air Quality Management Component**
Air Quality Management components for the Saline Habitat Complex configurations would be the same as those described under the Partial Sea configurations.

**Sedimentation/Distribution Basin Component**
Sedimentation/Distribution Basin components for the Saline Habitat Complex configurations would be the same as those described under the Partial Sea configurations.

**Habitat Benefits**
The habitat benefits of the Saline Habitat Complex would be similar to existing shallow saline habitat along the shorelines of the Salton Sea and the brackish water near the confluences with the New, Alamo, and Whitewater rivers. The amount of shallow saline habitat could be greater than under Partial Sea configurations.

**Treatment Facilities**
Considerations for water treatment components for the Saline Habitat Complex configurations would be the same as those described under the Partial Sea configurations.

**Application of Screening Criteria to Range of Configurations**
Screening criteria were used to further define the configurations and identify the range of alternatives. The screening criteria were based on compliance with the definitions of reasonable range of alternatives and feasibility under CEQA and federal and State requirements for water quality, air quality, and endangered species protection.

Based on CEQA, this PEIR identified a reasonable range of alternatives to:

- Permit a reasoned choice;
- Include alternatives that would substantially lessen or avoid significant effects of an action; and
- Feasibly attain most of the basic objectives.

The CEQA Guidelines state that the following factors, among others, may be taken into account when addressing the “feasibility” of alternatives:

- Site suitability;
- Economic viability;
- Availability of infrastructure;
- General plan consistency;
- Regulatory limitations;
- Jurisdictional boundaries; and
- Ability to legally acquire, control, or have access to the site.

For the configurations considered in the PEIR, several of these factors were either applied during the development of the configurations or were not applicable. For example, the suitability of the site was considered in the identification of the components in each of the configurations to the level of detail possible in the initial phases of the study. Economic viability and availability of infrastructure were not considered at this time because the configurations are being considered to meet the objectives without
bias toward limitations of available funds for construction and operations and maintenance or limitations of existing infrastructure.

General plan consistency was considered indirectly by evaluating the potential for recreational or local economic development of the alternatives. However, the objectives emphasize restoration of habitat and air quality management associated with the restoration activities. This may not be consistent with all portions of the general plans.

Regulatory limitations related to water quality, air quality, and special status species were considered as part of the broad screening criteria used to further define the concepts and develop the configurations. These regulations continue to be applied to the configurations.

Consideration for jurisdictional boundaries and the ability to legally acquire, control, and have access to a site are generally assumed in the development of the configurations and the alternatives for lands currently inundated by the Salton Sea. Lands owned by the federal government are used as a repository for drainage from the Imperial and Coachella valleys and for fish and wildlife management (Sonny Bono Salton Sea National Wildlife Refuge). In addition, State lands are used for recreation (Salton Sea State Recreation Area). It is assumed that these lands would continue to be available for these uses under implementation of the ecosystem restoration plan. Inundated lands owned by individuals, Imperial Irrigation District, and Coachella Valley Water District also are assumed to be available for the purposes of the PEIR either directly, through purchase, or through trade of similar lands located in other areas. Use of lands owned by the Torres Martinez Tribe would require agreements between the United States and the tribe for changes in land use under the restoration actions. It is assumed for the purposes of the PEIR that these agreements could be obtained for the currently inundated lands based upon the participation of the Tribe in previous planning efforts (Salton Sea Authority, 2004). However, the feasibility of acquiring land or easements for construction and operations and maintenance of facilities would need to be considered in project-level analyses. If such agreements could not be obtained, facilities would need to be modified.

Construction and operations and maintenance of facilities located in Mexico would require extensive agreements between the United States and Mexico. Many of the previous studies have evaluated importing water from and exporting water to the Gulf of California in conjunction with establishment of an extension of the Gulf of California to either Laguna Salada or Mexicali, as described above. If such a connection was constructed with approvals from governments in Mexico, it may be possible to extend the facilities to provide water into the United States. However, there would remain an issue of reliability if those facilities were not maintained for the purpose of providing water to the Whole Sea.

**Incorporation of Comments from Stakeholders**

The configurations were presented to the Salton Sea Advisory Committee, public, and other stakeholders. Comments received from these groups were considered as part of the screening process. Comments were related to developing different alternatives with a range of components, inflows, water surface elevations, and salinities.

Based upon a recommendation from the Salton Sea Advisory Committee, a range of alternatives was used to represent many permutations for the purposes of selecting a general direction for future project-level analyses. For example, comparison of alternatives with the same water surface elevations and salinity objectives would provide a prioritization of benefits and impacts for selection of a type of facility configuration, such as Saline Habitat Complex cells. However, during project-level analyses, specific sizes, locations, and salinity objectives would be determined based upon more detailed analysis of inflows, bathymetry, water quality, geology, habitat, sediment quality, and land ownership.

During project-level analyses, the combination and location of components should be evaluated. For example, it may be desirable and advantageous depending upon the rate at which the water recedes to provide facilities to separate the Brine Sink into cells that could be managed with separate salinity
objectives. These modifications could be included in most or all of the alternatives considered in the PEIR and would not affect the prioritization of the benefits and impacts of the alternatives as arrayed in the PEIR.

There were many comments that suggested combining Saline Habitat Complex cells with the Partial Sea configuration to extend water along the shorelines and increase shallow water habitat. Saline Habitat Complex areas were incorporated into several of the alternatives with Partial Seas.

The results of the application of the criteria are presented in Table 2-3.

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Comments</th>
<th>Screening Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Sea Configuration - Import-Export Water from and to the Gulf of California</td>
<td>This configuration may be feasible if a canal or shipping channel was extended from the Gulf of California to Laguna Salada or Mexicali under a separate effort. However, to construct either a canal or a combination of canals and pipelines in Mexico for the sole purpose of ecosystem restoration in the Salton Sea would require agreements with governments in Mexico for construction and operations and maintenance. Access to the facilities would not necessarily be guaranteed and if the facilities were owned and operated by federal, State, or local governments, the United States would need to negotiate agreements with the Mexican government. This configuration does not meet the CEQA requirement for feasibility of the need to legally be able to control or have access to the site.</td>
<td>Eliminated from further analysis in the PEIR</td>
</tr>
<tr>
<td>Whole Sea Configuration - Import-Export Water from and to the Pacific Ocean</td>
<td>This configuration would require compliance with water quality and environmental protection regulations for intakes and outfalls along the Southern California coast. It is uncertain if agreements with federal, State, and local agencies could be negotiated for the required large facilities. Recently, several desalination proposals have been discussed for the California coastline. The proposed desalination facilities were only 1 to 2 percent of the size of the Import-Export from and to the Pacific Ocean. The responses from the regulatory agencies to the proposed desalination facilities were considered in determining the feasibility of this configuration. It appears to be feasible to construct and operate intakes and outfalls along the coastline, however, there are significant research and monitoring requirements related to water quality and environmental protections for the proposed desalination facilities. At this time, it does not appear to be feasible to develop a 9,200 acre-feet/day (3 billion gallon/day) intake and 7,700 acre-feet/day (2.5 billion gallon/day) outfall that would be permitted along the Southern California coastline without extensive monitoring programs during project-level analyses. This alternative also would require extensive agreements from federal, State, and local governments for the conveyance corridor between the Whole Sea and the Camp Pendleton.</td>
<td>Eliminated from further analysis in the PEIR</td>
</tr>
<tr>
<td>Partial Sea Configuration - Concentric Rings</td>
<td>This configuration is considered to be feasible for further analysis. This configuration does not include any Saline Habitat Complex cells.</td>
<td>To be considered as an Alternative</td>
</tr>
<tr>
<td>Partial Sea Configuration - North Sea</td>
<td>This configuration is considered to be feasible for further analysis. Based on comments from the Salton Sea Advisory Committee and stakeholders, this configuration was modified to include Saline Habitat Complex along the western, southern, and eastern shoreline.</td>
<td>To be considered as an Alternative</td>
</tr>
</tbody>
</table>
Chapter 2
Development of Alternatives

Table 2-3
Results of the Application of Screening Criteria to Range of Configurations

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Comments</th>
<th>Screening Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Sea Configuration - North Sea Combined</td>
<td>This configuration is considered to be feasible for further analysis. Based on comments from the Salton Sea Advisory Committee and stakeholders, this configuration was modified to include Saline Habitat Complex along the western, southern, and eastern shorelines.</td>
<td>To be considered as an Alternative</td>
</tr>
<tr>
<td>Partial Sea Configuration - South Sea</td>
<td>This configuration is considered to be feasible for further analysis. However, based on comments from the Salton Sea Advisory Committee and stakeholders, this configuration was not included in the Final Range of Alternatives because the benefits and impacts would be similar to those in the South Sea Combined configuration. If that configuration was selected as the preferred alternative, this concept could be evaluated in the project-level analyses.</td>
<td>Eliminated from further analysis in the PEIR</td>
</tr>
<tr>
<td>Partial Sea Configuration - South Sea Combined</td>
<td>This configuration is considered to be feasible for further analysis. Based on comments from the Salton Sea Advisory Committee and stakeholders, this configuration was modified to include Saline Habitat Complex along the western and eastern shoreline.</td>
<td>To be considered as an Alternative</td>
</tr>
<tr>
<td>Saline Habitat Complex Configurations</td>
<td>This configuration is considered to be feasible for further analysis. Based on comments from the Salton Sea Advisory Committee and stakeholders, two Saline Habitat Complex configurations were identified for the final range of alternatives. One configuration would use temporary measures to mix saltwater from the Brine Sink and inflows in the initial Saline Habitat Complex cells. Then, water elevations and salinity would be managed by controlling flows into and out of the cells. This configuration would minimize the amount of Saline Habitat Complex cells to reduce infrastructure and would include 26,000 acres of open water and 12,000 acres of land. The second configuration would pump saltwater from the Brine Sink to mix with the inflows prior to diversion into the Saline Habitat Complex cells. This configuration would maximize the amount of Saline Habitat Complex cells that could be constructed in the Sea Bed and would include 44,000 acres of open water and 21,000 acres of land.</td>
<td>To be considered as two Alternatives</td>
</tr>
</tbody>
</table>

Step 5: Development of the Final Range of Alternatives

The results of the analysis of configurations were discussed with the Salton Sea Advisory Committee. After consideration of input from the public and stakeholders, the Salton Sea Advisory Committee recommended that the Whole Sea Configurations not be considered further.

During the analysis, the Salton Sea Advisory Committee also recommended that proposals developed concurrently by the Salton Sea Authority and the Imperial Group under separate programs be included in the alternatives considered in the PEIR. The proposal prepared by the Salton Sea Authority was similar to the Partial Sea - North Sea Combined configuration with different assumptions for the size and location of the Partial Sea, Air Quality Management, and several other components. The proposal prepared by the Imperial Group was similar to the Partial Sea - Concentric Rings configuration with different assumptions for construction techniques and locations for the Partial Sea, Air Quality Management, and several other components. The proposal prepared by the Imperial Group was similar to the Partial Sea - Concentric Rings configuration with different assumptions for construction techniques and locations for the Partial Sea, Air Quality Management, and several other components. The proposal prepared by the Imperial Group was similar to the Partial Sea - Concentric Rings configuration with different assumptions for construction techniques and locations for the Partial Sea, Air Quality Management, and several other components. These alternatives were added based upon information provided by these groups in February.
and March 2006, as presented in Appendix I. The final range of alternatives is described in detail in Chapter 3 and Appendix H-7. The alternatives were listed in the following order to represent an increasing amount of complexity and number of components:

- Alternative 1 – Saline Habitat Complex I (does not include long term facilities to pump saltwater from the Brine Sink and does not maximize the amount of Saline Habitat Complex cells);
- Alternative 2 – Saline Habitat Complex II (includes long term facilities to pump saltwater from the Brine Sink and maximizes the amount of Saline Habitat Complex cells based upon bathymetry);
- Alternative 3 – Concentric Rings (includes two concentric water bodies, or rings, and no Saline Habitat Complex cells);
- Alternative 4 – Concentric Lakes (as defined by the Imperial Group);
- Alternative 5 – North Sea (includes Saline Habitat Complex cells);
- Alternative 6 – North Sea Combined (includes Saline Habitat Complex cells);
- Alternative 7 – Combined North and South Lakes (as defined by the Salton Sea Authority); and
- Alternative 8 – South Sea Combined (includes Saline Habitat Complex cells).