CHAPTER 6
ENVIRONMENTAL CONSEQUENCES OF PHASE 2 ACTIONS

Phase 2 actions would be implemented at the end of Phase 1, which is projected to occur around the year 2030. Phase 2 actions would be needed to extend the useful service life of Phase 1 actions and to provide long-term solutions to the problems at the Salton Sea. At this stage of the Salton Sea Restoration Project planning process, only preliminary conceptual designs of Phase 2 actions have been developed. More detailed designs will be developed following decisions on Phase 1 alternatives, during the Phase 1 design and construction phase, unless the No Action Alternative is selected. Because detailed designs have not yet been developed it is not possible to develop detailed evaluations of environmental consequences of Phase 2 actions. Instead, more general descriptions of the potential environmental consequences of each alternative are provided. These descriptions are intended to provide the decision-makers with an overall picture of the consequences of the total Restoration Project.

6.1 NO ACTION/NO PROJECT ALTERNATIVE

While several projects being considered near or within the Salton Sea Restoration Project study area could affect inflows to the Sea, none of these projects have yet been approved or funded. Therefore, for purposes of analysis, project effects have been evaluated against three No Action/No Project inflow scenarios:

- Current (present-day) inflow conditions continue throughout both Phases 1 and 2, with average annual inflows of 1.36 maf/yr;
- Annual inflows are incrementally reduced throughout Phase 1 to 1.06 maf/yr at the beginning of Phase 2; inflows remain at 1.06 maf/yr throughout Phase 2; and
- Annual inflows are incrementally reduced throughout Phase 1 and continue to decline into Phase 2 until they reach 0.8 maf/yr.

These potential future inflow scenarios are considered reasonable future scenarios, in light of the varied projects currently under consideration that may ultimately gain approval. In addition to different inflow scenarios, the conditions at the Sea at the beginning of Phase 2 will depend on whether Phase 1 alternatives have been implemented. Therefore, the discussions that follow are divided into two cases—without Phase 1 alternatives and with Phase 1 alternatives.

6.1.1 No Action/No Project for Phase 2 without Phase 1 Actions

If Phase 1 actions are not implemented, conditions at the Salton Sea will continue to deteriorate during Phase 2. Projected water surface elevation and salinity for each inflow condition at the beginning of Phase 2 and in the year 2060 are as follows:

	Present Day		Year 2030		Year 2060	
Final Inflow Condition	**Elevation (feet)**	**Salinity (mg/L)**	**Elevation (feet)**	**Salinity (mg/L)**	**Elevation (feet)**	**Salinity (mg/L)**
Current	-227	44,000	-224	52,896	-223	64,253
1.06 maf/year	NA	NA	-234	75,050	-241	122,530
0.8 maf/year	NA	NA	-234	75,043	-249	177,848

Notes: NA = not applicable

No Action with Continuation of Current Inflows

From the data shown above, for continuation of current inflow conditions, there would be little change in the water surface elevation of the Sea throughout the Phase 2 period. However, the salinity would increase significantly. By the beginning of Phase 2, salinity would have exceeded 50,000 mg/L and it would continue to rise to the projected value of 64,253 mg/L by the year 2060. All significant adverse environmental consequences of the No Action/No Project alternative with continuation of current conditions, as discussed for Phase 1 in Chapter 4, would continue in Phase 2. Significant adverse impacts would include loss of fish populations due to increased salinity. This reduction of food base would have serious impacts to the biodiversity of the Sea and could negatively impact population levels of fish eating birds. In addition, none of the project goals would be attained.

No Action with Reduced Inflows

For reduced inflow conditions, the changes would be much greater than for continuation of current inflow conditions. For example, if annual inflows decline to 1.06 maf/yr, the water surface elevation would drop about 14 feet from the present day and the salinity would exceed 120,000 mg/L by 2060. If annual inflows decline to 0.8 maf/yr, the water surface elevation would drop about 22 feet and the salinity would exceed 175,000 mg/L by 2060.

The environmental consequences of the No Action/No Project alternative for continuation of current conditions and inflow reductions to 1.06 maf/yr are discussed in Chapter 4. The further reduction of inflows to 0.8 maf/yr would accelerate the deterioration of the Sea. All significant adverse environmental consequences of the No Action/No Project alternative with reduced inflow conditions as discussed for Phase 1 in Chapter 4 would continue in Phase 2. Significant adverse impacts would include rapid loss of fish populations with related negative impacts to birds in the Sea and none of the project goals would be attained. In addition, the environmental impacts would be more severe or occur more rapidly if inflows are further reduced from 1.06 maf/yr to 0.8 maf/yr.

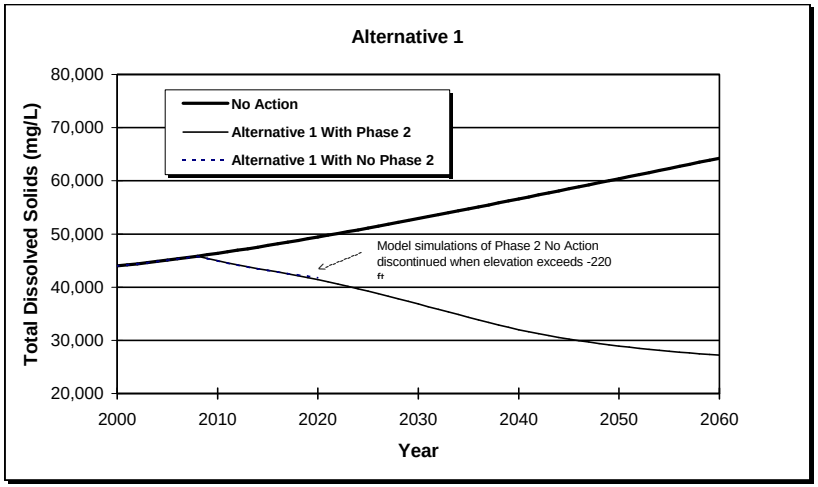
6.1.2 No Action/No Project for Phase 2 with Phase 1 Actions In-Place

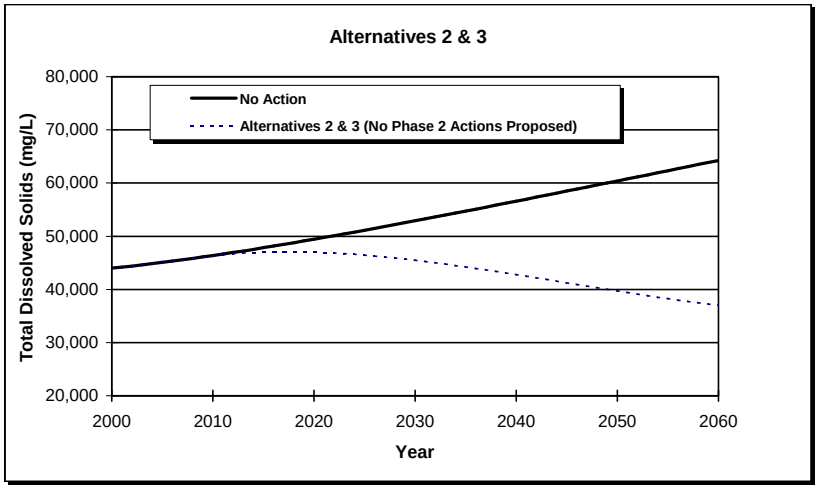
If Phase 1 actions are implemented but no additional actions are taken for Phase 2, the environmental consequences would depend on the alternative and the long-term inflow condition at the Sea. The consequences of No Action during Phase 2 with Phase 1 actions in-place for each alternative are discussed below. Table 6.1-1 presents a summary of the performance of project alternatives along with the alternative for No Action during Phase 1. Table 6.1-1 illustrates expected conditions in the Sea with Phase 1 actions in-place, if Phase 2 actions are not implemented. In the case of Alternative 1, the data in Table 6.1-1 for 2030 shows the effect of constructing Phase 1 actions without the accelerated export in 2015. Figures 6.1-1 through 6.1-6 illustrate salinity and elevation over time for each of the three inflow scenarios, for each alternative with and without Phase 2 actions.

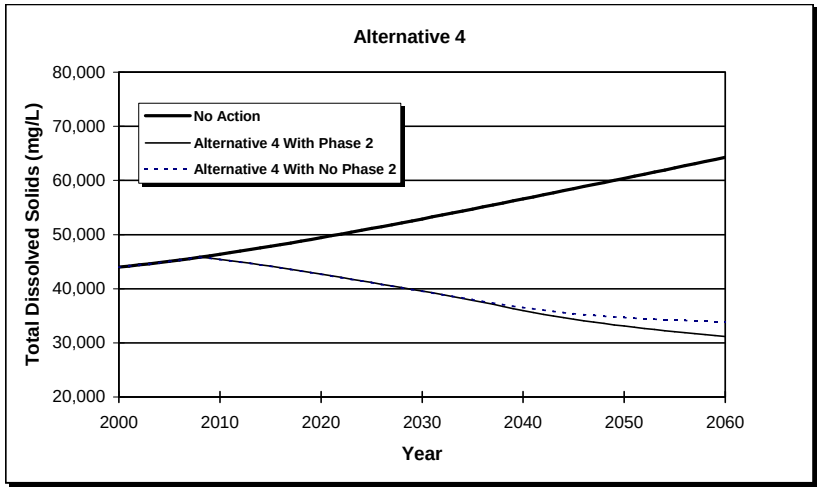
Alternative 1 or 5: No Action in Phase 2 with Phase 1 Actions In-place

Continuation of Current Inflow Conditions. If the evaporation ponds are constructed during Phase 1 as part of Alternative 1, and no additional measures are implemented during Phase 2, the ponds will have a limited life based on seismic design considerations. Likewise, a single pond constructed during Phase 1 for Alternative 5 would also have a limited life. The pond in Alternative 5 would fill-up with salts, so that it would be unusable during Phase 2. Salinity in the Sea would then rise to unacceptable levels early in Phase 2. If inflows continue at current levels, the Sea level would also rise several feet above its current level. The ponds in Alternative 1 are assumed to be unusable for salinity control after 30 years under the assumption that they have failed due to seismic events.

Reduced Inflows. If future inflows are reduced to 1.06 or 0.8 maf/yr, then the Sea elevation would begin to drop and the salinity would rapidly increase. Regardless of the inflow condition, project goals would not be achieved under No Action for Phase 2, if Phase 1 Alternative 1 is in place. Significant adverse impacts are expected.







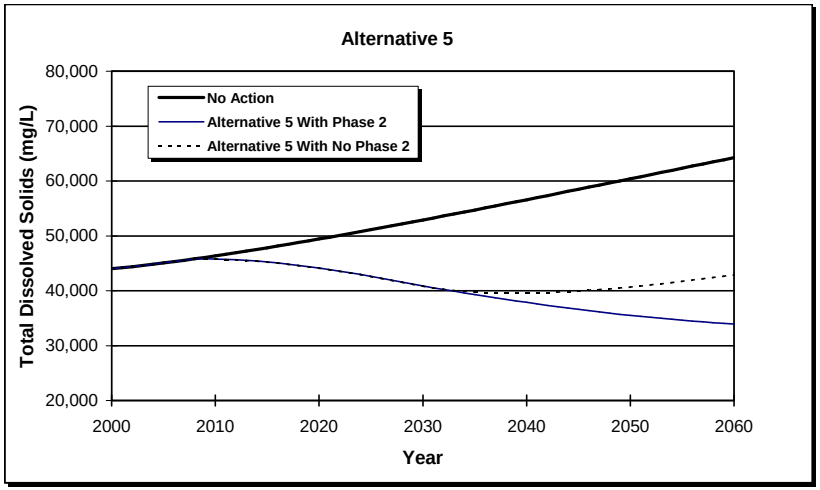
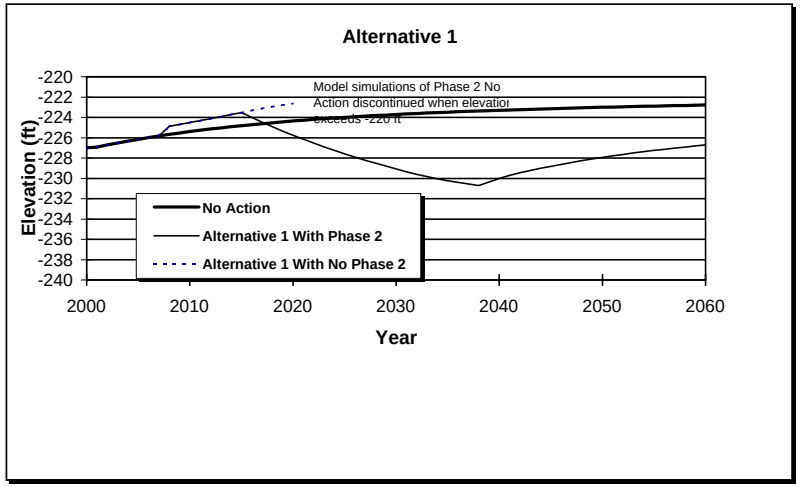
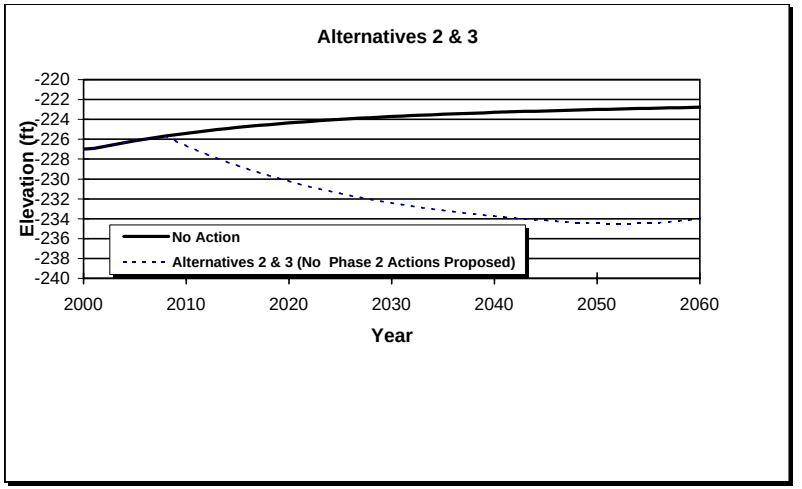
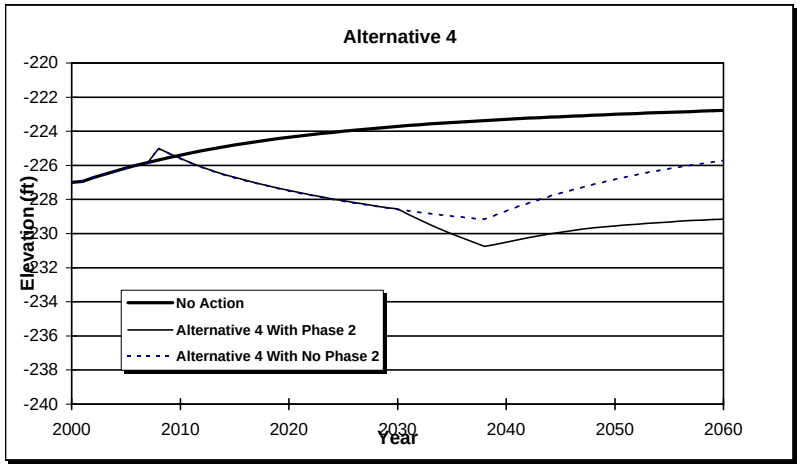


Figure 6.1-1 Comparison of Salinity at 1.36 maf/yr Inflow With and Without Phase 2 Actions







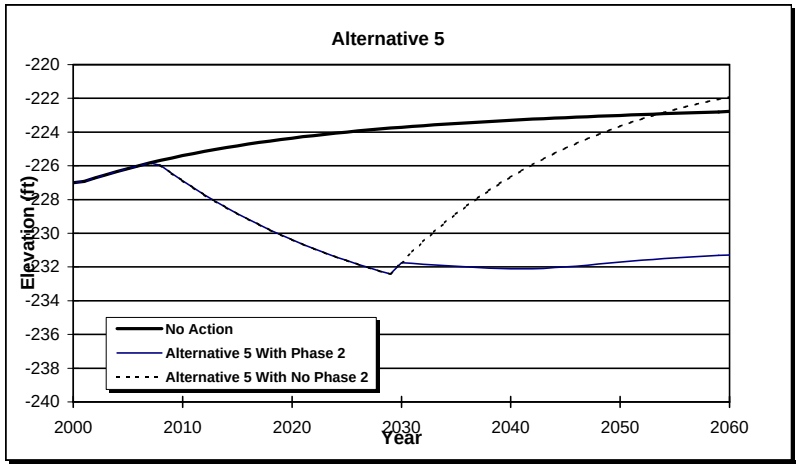
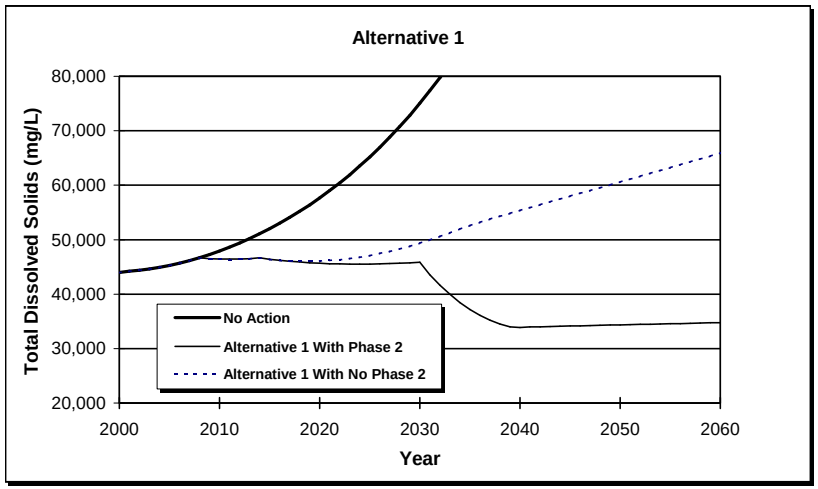
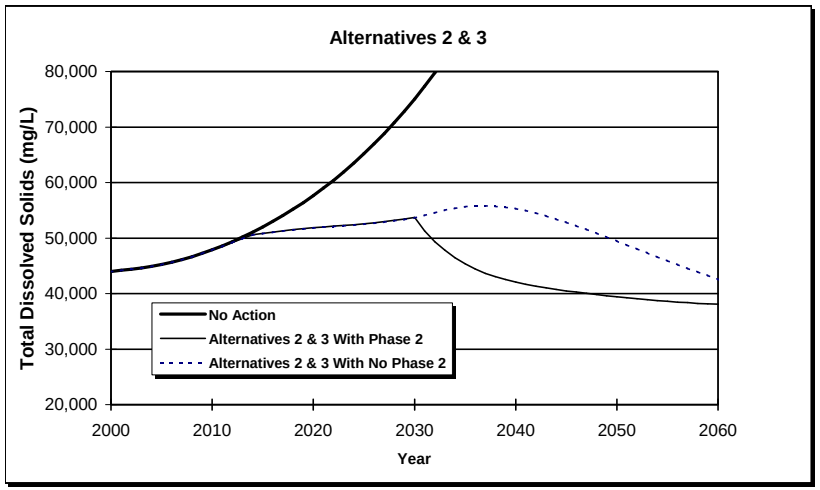
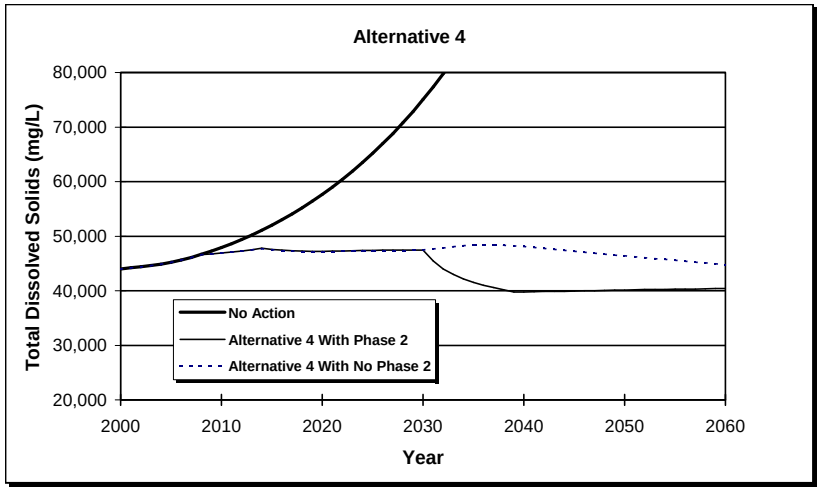


Figure 6.1-2 Comparison of Elevation at 1.36 maf/yr Inflow With and Without Phase 2 Actions







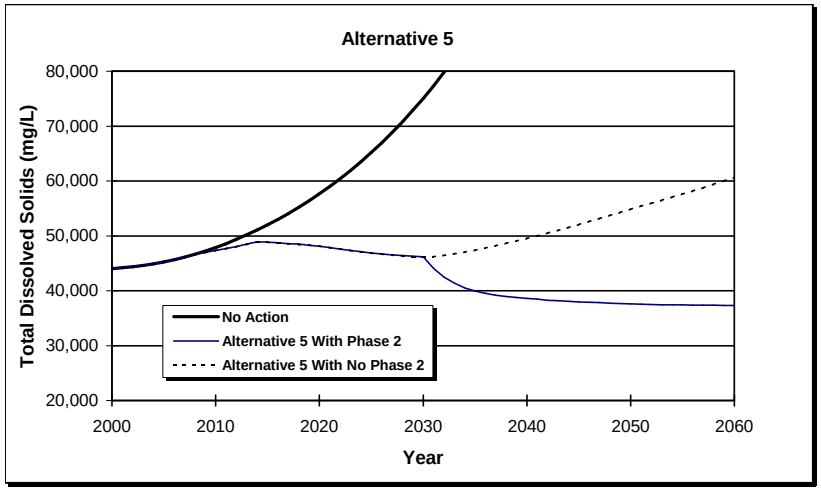
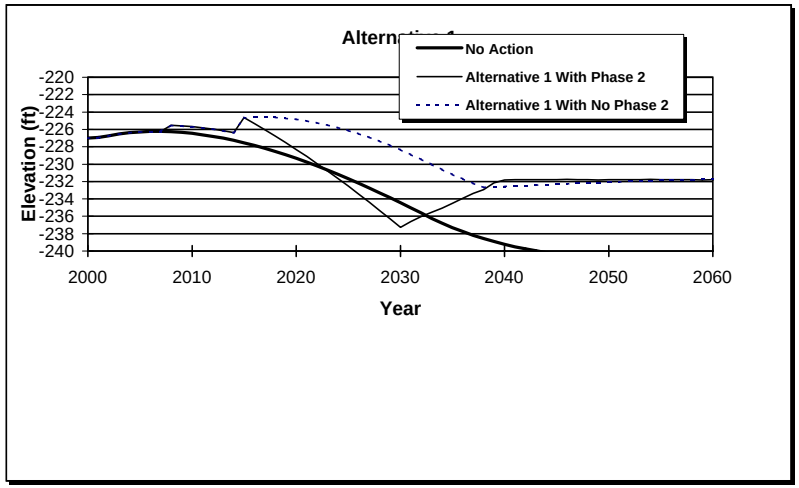
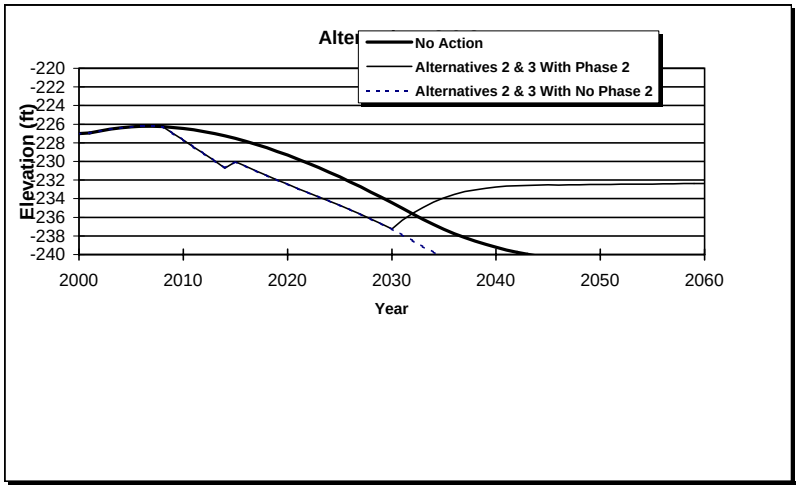
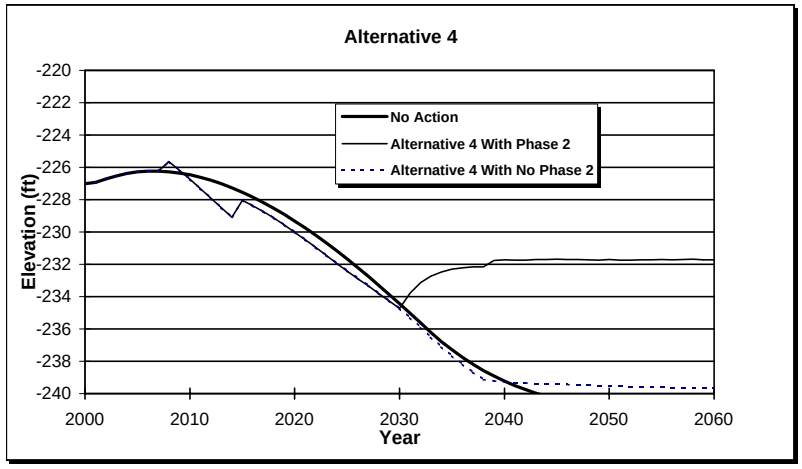


Figure 6.1-3 Comparison of Salinity at 1.06 maf/yr Inflow With and Without Phase 2 Actions







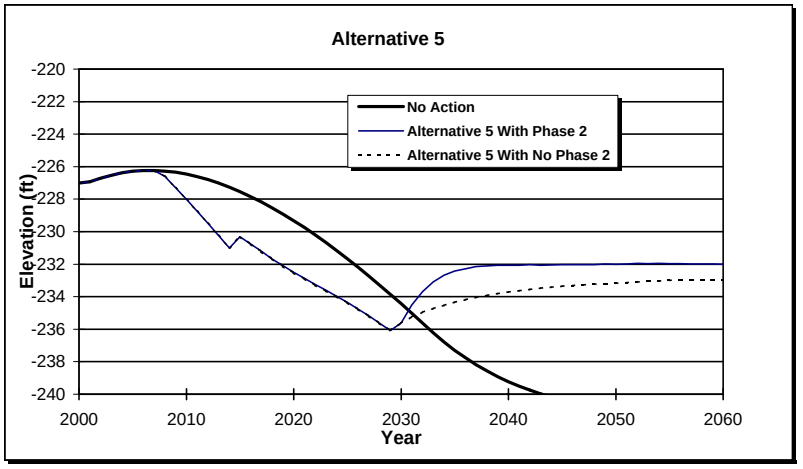
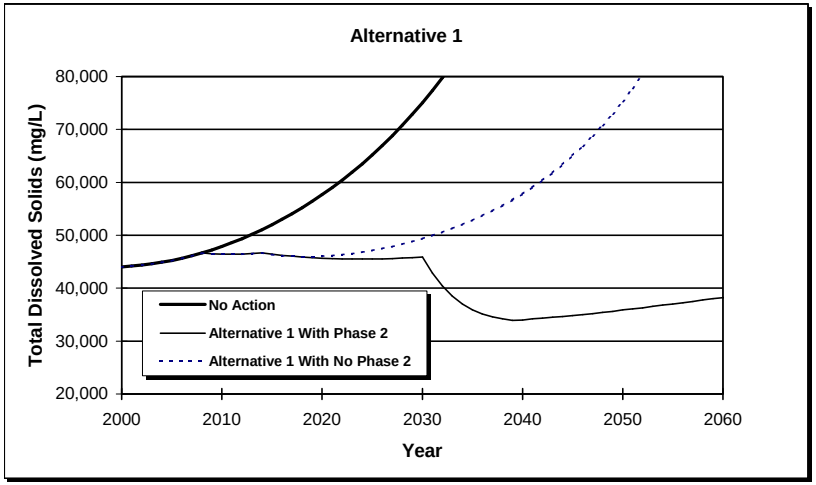
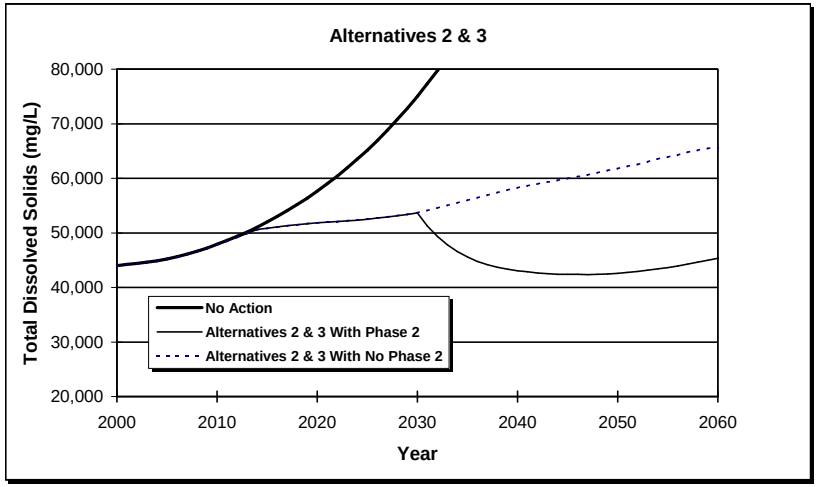
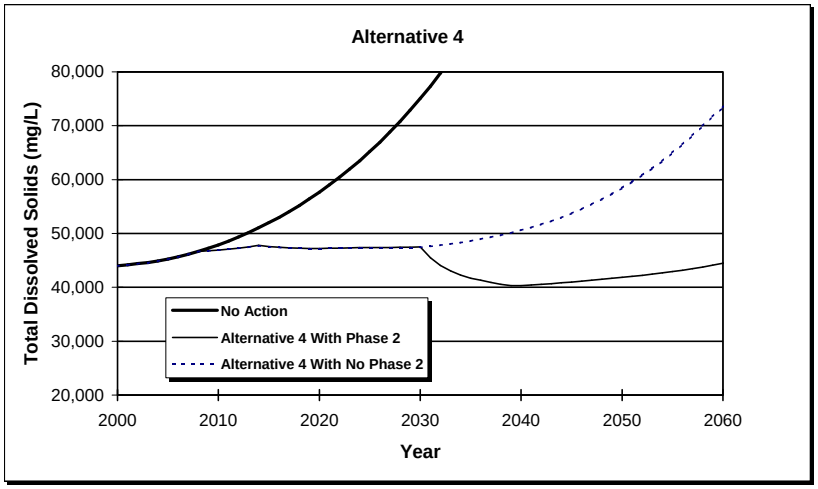


Figure 6.1-4 Comparison of Elevation at 1.06 maf/yr Inflow With and Without Phase 2 Actions







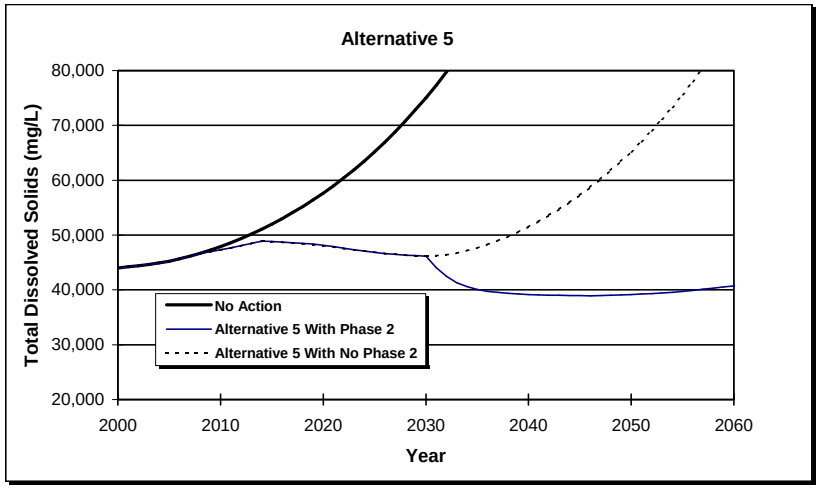
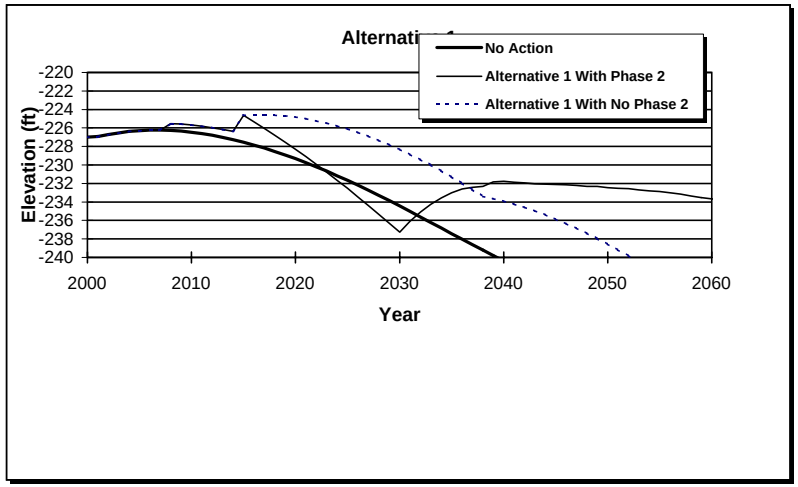
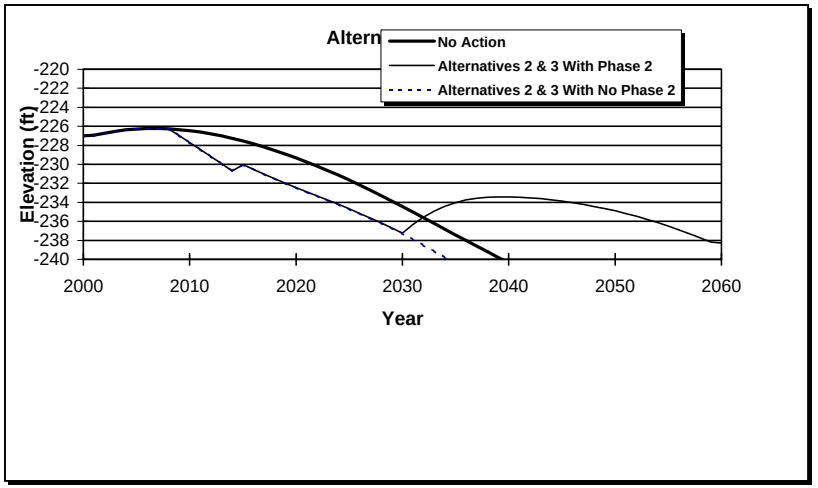
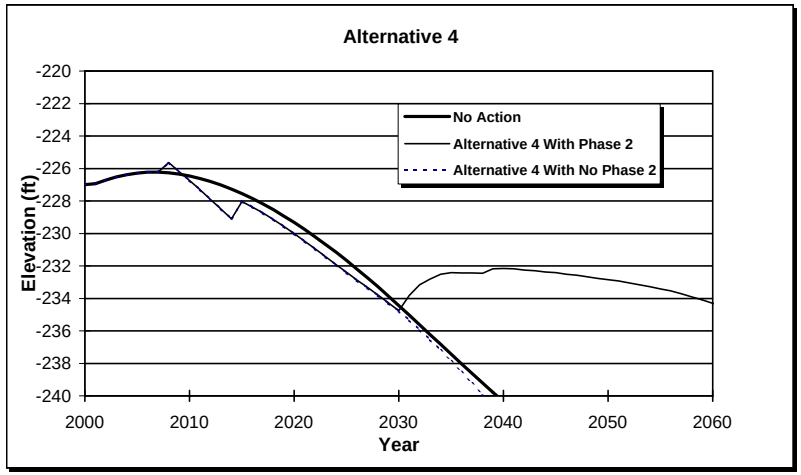


Figure 6.1-5 Comparison of Salinity at 0.80 maf/yr Inflow With and Without Phase 2 Actions







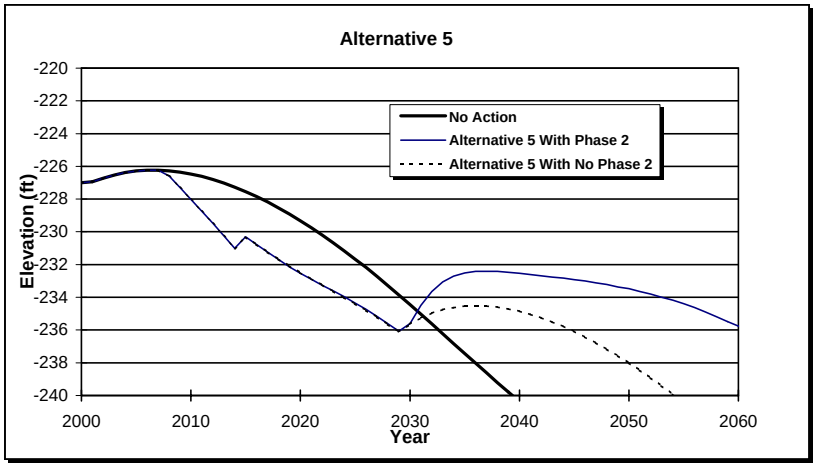


Figure 6.1-6 Comparison of Elevation at 0.80 maf/yr Inflow With and Without Phase 2 Actions

Alternative 2 or 3: No Action in Phase 2 with Phase 1 In-place

Continuation of Current Inflow Conditions. If an EES is constructed during Phase 1 as part of Alternative 2 or 3, no additional measures are proposed during Phase 2. It is possible that project goals could be met if current inflow conditions continue. This situation can be seen from the data provided in Table 6-1. From Table 6-1, if current inflow conditions continue, by 2060, the salinity could be maintained near 37,000 mg/L and elevation would be at about –234 ft, msl without additional Phase 2 actions.

Reduced Inflows. If future inflows are reduced to 1.06 or 0.8 maf/yr, then the Sea elevation would begin to drop and the salinity would rapidly increase without additional imports proposed as Phase 2 actions for reduced inflow scenarios. With either reduced inflow condition, project goals would not be achieved under No Action for Phase 2, if either Phase 1 Alternative 2 or 3 were in place. Significant adverse impacts are expected.

Alternative 4: No Action in Phase 2 with Phase 1 In-place

Continuation of Current Inflow Conditions. If an EES and the evaporation ponds are constructed during Phase 1 as part of Alternative 4, and no additional measures are implemented during Phase 2, it is not possible that project goals could be met if current inflow conditions continue. Similar to Alternative 1, the pond would be unusable during Phase 2 because of failure due to seismic events. If the EES were not expanded, then salinity in the Sea would begin to rise. The long-term adverse effects on aquatic and avian species associated with elevated salinity would be expected to occur as salinity would gradually increase during Phase 2.

Reduced Inflows. If future inflows are reduced to 1.06 or 0.8 maf/yr, then the Sea elevation would begin to drop and the salinity would rapidly increase. With either reduced inflow condition, project goals would not be achieved under No Action for Phase 2, if Phase 1 Alternative 4 is in place. Significant adverse impacts are expected.

6.2 PERFORMANCE OF PHASE 2 ALTERNATIVES FOR DIFFERENT INFLOW CONDITIONS

Table 6-1 illustrates how closely the long-term project goals could be met by each alternative during Phase 2, for each of the three inflow scenarios. As shown for the year 2060 for all restoration alternatives and all three inflow conditions, salinity could be maintained at an acceptable level for fish and wildlife, compared to No Action. Likewise, elevation could be managed much closer to the target level than under No Action.

For Alternative 1, if inflows are reduced to 0.8 MAFY, flood flows would be imported to supplement the reduced inflow. In each of the other alternatives, importation of flood flows would have already been initiated in Phase 1, when inflows were reduced to 1.06 MAFY, and would simply be continued in Phase 2. The impacts of importation of flood flows, both in the Salton Sea Basin and on the Colorado River downstream of the point of diversion at Imperial Dam, would be generally the same as previously described for Phase 1 in Section 4.1.6. The trend toward reduction in the availability of flood flows is expected to continue beyond 2040 (see Figure 4.1-7 in Chapter 4), reducing the reliability of flood flows as a means of maintaining elevation of the Salton

Sea, and potentially reducing the quantity of excess water delivered to Mexico. These effects become increasingly speculative as the planning horizon is extended into the future. As described in Chapter 4, the potential for adverse effects of occasional flood flow diversions to the Salton Sea on the Colorado River downstream of the point of diversion are likely to be small compared to the level of uncertainty of benefits from flood flows under the No Action Alternative. Also, some of the potential benefits foregone in the Colorado Delta due to the diversion of flood flows from the Colorado River would be similar in nature to the benefits obtained by use of these flood flows to meet environmental objectives at the Salton Sea. For these benefits, the diversion of flood flows to the Salton Sea does not necessarily represent a net reduction in benefits, but rather a change in the location of the benefits, and perhaps a net increase in benefits due to more effective use of the water.

6.3 PHASE 2 EXPORT ALTERNATIVES

An overview of the environmental consequences of Phase 2 export actions for all environmental resources is provided in Table 6.3-1. The following discussions in this section include a brief review of the description of each alternative. Expanded descriptions of each of the actions can be found in Chapter 2.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
Surface Water Resources					
➢ Surface Water Hydrology	Impacts would be the same as those described for the EES in chapter4.	Discharging Salton Sea water into the Gulf of California could potentially result in a significant impact on the receiving water. Discharges from Salton Sea combined with other discharges, flow reductions, and water conservation efforts may cumulatively increase salinity impacts on Upper Gulf of California.	Discharging Salton Sea water into the Pacific could potentially result in a significant impact on the receiving water. Discharge of Salton Sea water into the Pacific Ocean combined with the existing point and non-point sources along the coast could have less than significant cumulative impact due to dilution of salts and nutrients in the ocean.	Discharging Salton Sea water into Palen Lake could potentially result in a significant impact on the receiving area.	No significant impact. Import of CASI water to Salton Sea would have a beneficial cumulative impact on the salinity of the Gulf of California.
➢ Salton Sea Circulation	No significant impact.	No significant impact.	No significant impact.	No significant impact.	No significant impact.
➢ Water Quality and Salinity	Beneficial impact to water quality and salinity in the Sea	Beneficial impact to water quality and salinity in the Sea	Beneficial impact to water quality and salinity in the Sea	Beneficial impact to water quality and salinity in the Sea	Beneficial impact to salinity in the Sea. Importing CASI water has the potential adverse impact of contributing trace elements to the Salton Sea.
➢ Water Use and Management	Impacts would be the same as those described for the EES in chapter4.	No significant impact.	No significant impact.	No significant impact.	No significant impact.
Ground Water Resources					
➢ Ground Water Hydrology	No significant impact.	No significant impact.	No significant impact.	No significant impact.	No significant impact.
➢ Ground Water Quality	No significant impact.	No significant impact.	No significant impact.	No significant impact.	No significant impact.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
➢ Ground Water Use and Management	No significant impact.	No significant impact.	No significant impact.	No significant impact.	No significant impact
Geology and Soils					
➢ Soils and Sediments	The proposed Bombay Beach EES site may be subject to both wind and stream erosion. Construction and post-construction erosion-control measures would be developed to minimize this impact to a less than significant level.	Soil disturbance during pipeline construction would result in the increased potential for soil erosion. This impact would not be significant with the implementation of construction and post-construction erosion-control measures.	Soil disturbance during pipeline construction would result in the increased potential for soil erosion. This impact would not be significant with the implementation of construction and post-construction erosion-control measures.	Soil disturbance during pipeline construction would result in the increased potential for soil erosion. This impact would not be significant with the implementation of construction and post-construction erosion-control measures.	Soil disturbance during canal construction would result in the increased potential for soil erosion. This impact would not be significant with the implementation of construction and post-construction erosion-control measures.
➢ Geologic Hazards	Geologic hazards could damage the structures associated with the expanded EES. Repairs to damaged structures would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level.	Geologic hazards could cause structural damage to the pipeline. Repairs to damaged structures would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level.	Geologic hazards could cause structural damage to the pipeline. Repairs to damaged structures would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level.	Geologic hazards could cause structural damage to the pipeline. Repairs to damaged structures would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level.	Geologic hazards could cause structural damage to the canal. Repairs to damaged structures would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level.
Air Quality					
➢ Air Quality Conditions	Construction activities would have potentially significant emissions. Operating the expanded EES system would result in significant impacts associated with drifting salt spray downwind of the site.	Construction activities would have potentially significant emissions.	Construction activities would have potentially significant emissions.	Construction activities would have potentially significant emissions.	Construction activities might have minor impacts, which could be controlled with standard construction practices.
➢ Air Quality Planning	Operating expanded EES modules and associated equipment would require air quality permits from relevant air pollution control district.	Operating pumping plants probably would require air quality permits from Imperial County Air Pollution Control District.	Operating pumping plants probably would require air quality permits from San Diego Air Pollution Control District.	Operating pumping plants probably would require air quality permits from relevant air pollution control district.	Operating pumping plants probably would require air quality permits from relevant air pollution control district.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
Noise					
➢ Noise Effects	Minor short-term local construction noise. Increased operational vehicular noise but not significant.	Minor short-term local construction noise. Potential sensitive receptors along pipeline route could be temporarily affected.	Minor short-term local construction noise. Potential sensitive receptors along pipeline route could be temporarily affected.	Minor short-term local construction noise. Potential sensitive receptors along pipeline route could be temporarily affected. Impacts would be less than those anticipated for export to the Gulf of California or the Pacific.	Minor short-term local construction noise would be controlled with standard practices. No operational noise impacts are expected.
Fisheries and Aquatic Ecosystems					
➢ Lower Trophic Levels	Beneficial effects from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	Potential adverse impacts to resident species in the Gulf of California due to further degradation of water quality problems. Potential export of "exotic species".	Potential adverse impacts to resident species due to further degradation of water quality problems. Potential export of "exotic species".	No impacts because this is a dry lake.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Fish	Beneficial effects from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	Potential adverse impacts to resident species in the Gulf of California due to further degradation of water quality problems. Potential export of "exotic species".	Potential adverse impacts to resident species due to further degradation of water quality problems. Potential export of "exotic species".	No impacts to fisheries because this is a dry lake. Potential export of "exotic species".	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Special Status Species	Beneficial effects from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	Potential adverse impacts to resident species in the Gulf of California due to further degradation of water quality problems and exotic species export.	Potential adverse impacts to resident species due to further degradation of water quality problems and exotic species export.	No impacts to special status species because this is a dry lake.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Sport Fisheries	Beneficial from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	Potential adverse impacts to resident species in the Gulf of California due to further degradation of water quality problems and exotic species export.	Potential adverse impacts to resident species due to further degradation of water quality problems and exotic species export.	No impacts to sport fisheries because this is a dry lake.	Beneficial effects due to stabilization of shoreline and reduced salinity.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
Avian Resources					
➢ Bird Species	Beneficial effects from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	No impact.	No impact.	Potential significant impact resulting from possible occurrence of an outbreak of avian botulism.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Special Status Species	Beneficial effects from improved water quality conditions in the Sea. Salinity levels would be reduced to acceptable levels.	No impact.	No impact.	Potential adverse impact due to possibility of flooding at Palen Lake.	Beneficial effects due to stabilization of shoreline and reduced salinity.
Vegetation and Wildlife					
➢ Plant Communities	Potential significant adverse impact due to loss of habitat from constructing EES facilities. Also adverse impacts to surrounding vegetation due to salt spray blowing from the EES.	Adverse impact due to loss of habitat from constructing export facilities.	Adverse impact due to loss of habitat from constructing export facilities.	Adverse impact due to loss of habitat from constructing export facilities and from flooding.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Special Status Species	No impact.	No impact, assuming that the pipeline is constructed so as not to affect special status species along the corridor.	No impact, assuming that the pipeline is constructed so as not to affect special status species along the corridor.	Adverse impact due to loss of habitat from constructing export facilities and from flooding.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Sensitive Habitats	No impact.	No impact, assuming that the pipeline is constructed so as not to affect special status species along the corridor.	No impact, assuming that the pipeline is constructed so as not to affect special status species along the corridor.	Adverse impact due to loss of habitat from constructing export facilities and from flooding.	Beneficial effects due to stabilization of shoreline and reduced salinity.
➢ Sensitive Plants	No impact.	No impact, assuming that the pipeline is constructed so as not to affect special status species or sensitive habitats along the corridor.	No impact, assuming that the pipeline is constructed so as not to affect special status species or sensitive habitats along the corridor.	Adverse impact due to loss of habitat from constructing export facilities and from flooding.	Beneficial effects due to stabilization of shoreline and reduced salinity.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
Socioeconomics					
➢ Regional Economics					
Construction (Duration varies)	Positive, depending on proportions of workers employed and materials purchased from the local area.	Positive, depending on proportions of workers employed and materials purchased from the local area.	Positive, depending on proportions of workers employed and materials purchased from the local area.	Positive, depending on proportions of workers employed and materials purchased from the local area.	Positive, depending on proportions of workers employed and materials purchased from the local area.
Post-construction / Operation	Positive direct impacts, from permanent employment for operation and maintenance. Positive indirect impacts, from increased recreational use and commercial development.	Positive direct impacts, from permanent employment for operation and maintenance. Positive indirect impacts, from increased recreational use and commercial development.	Positive direct impacts, from permanent employment for operation and maintenance. Positive indirect impacts, from increased recreational use and commercial development.	Positive direct impacts, from permanent employment for operation and maintenance. Positive indirect impacts, from increased recreational use and commercial development.	Positive direct impacts, from permanent employment for operation and maintenance. Positive indirect impacts, from increased recreational use and commercial development.
Total Project Cost / Benefit	Unknown; primary benefit is to shorten time to reach target salinity level which could foster regional development and long-term economic benefits.	Unknown; primary benefit is to reduce salinity.	Unknown; primary benefit is to reduce salinity.	Unknown; primary benefit is to reduce salinity.	Unknown; primary benefit is to reduce salinity and maintain Sea elevation.
Total cost of project	$91 million per module.	$0.7 to $1.2 billion, depending on quantity transported.	$0.7 to $1.2 billion, depending on quantity transported.	$0.7 to $1.2 billion, depending on quantity transported.	Costs cannot be estimated at this time.
➢ Public Finance					
Construction	Neutral; revenues from sales and transient occupancy taxes likely to be offset by increased service costs. Long-term benefit from property tax revenues on new developments.	Neutral; revenues from sales and transient occupancy taxes likely to be offset by increased service costs. Long-term benefit from property tax revenues on new developments. Effects would be distributed across communities along the canal route.	Neutral; revenues from sales and transient occupancy taxes likely to be offset by increased service costs. Long-term benefit from property tax revenues on new developments. Effects would be distributed across communities along the canal route.	Neutral; revenues from sales and transient occupancy taxes likely to be offset by increased service costs. Long-term benefit from property tax revenues on new developments. Effects would be distributed across communities along the canal route.	Neutral; revenues from sales and transient occupancy taxes likely to be offset by increased service costs. Long-term benefit from property tax revenues on new developments. Effects would be distributed across communities along the canal route.
Post-construction / Operation	Negligible, possible benefits from property tax revenues. Revenues would likely be used to support increased demand for social services.	Negligible, possible benefits from property tax revenues. Revenues would likely be used to support increased demand for social services.	Negligible, possible benefits from property tax revenues. Revenues would likely be used to support increased demand for social services.	Negligible, possible benefits from property tax revenues. Revenues would likely be used to support increased demand for social services.	Negligible, possible benefits from property tax revenues. Revenues would likely be used to support increased demand for social services.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
➢ Demographics and Housing					
Construction	Slightly negative short-term impact, due to housing need of construction workforce.	Slightly negative short-term impact, due to housing need of construction workforce. Impact spread out over larger area during construction of canal.	Slightly negative short-term impact, due to housing need of construction workforce. Impact spread out over larger area during construction of canal.	Slightly negative short-term impact, due to housing need of construction workforce. Impact spread out over larger area during construction of canal.	Slightly negative short-term impact, due to housing need of construction workforce. Impact spread out over larger area during construction of canal.
Post-construction / Operation	May result in increased demand for permanent housing by new employees in recreation and visitor industries and for seasonal housing	Negligible minor increase in local housing demand.	Negligible minor increase in local housing demand.	Slightly negative short-term impact, due to housing need of construction workforce. Impact spread out over larger area during construction of canal.	Negligible minor increase in local housing demand.
Land Use and Planning					
➢ Urban Land Use	No significant impact, assuming that land use plans are modified under Phase I to account for expansion under Phase II. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Export to the Pacific Ocean may significantly contribute to cumulative land use impacts because of its route through heavily developed areas near the Ocean.	No impact Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.
➢ Commercial and Industrial Land Use	No impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Export to the Pacific Ocean may significantly contribute to cumulative land use impacts because of its route through heavily developed areas near the Ocean.	No significant impact Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.
➢ Public Land Use	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.	No significant impact. Contribution to cumulative land use impacts will be small unless significant development begins to occur in the affected areas.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
➢ Local Land Use Plans and Policies	May be incompatible with local land use plans.	May be incompatible with land use plans for affected jurisdictions.	May be incompatible with land use plans for affected jurisdictions.	May be incompatible with land use plans for affected jurisdictions	May be incompatible with land use plans for affected jurisdictions
Agricultural Land Resources					
➢ Agricultural Land Use	No impact. Phase 2 actions are not likely to significantly affect agriculturally important farmland and contribute to a cumulative impact.	No significant impact, assuming that the pipeline is constructed to avoid agriculturally important farmland. Phase 2 actions are not likely to significantly affect agriculturally important farmland and contribute to a cumulative impact.	No significant impact, assuming that the pipeline is constructed to avoid agriculturally important farmland. Phase 2 actions are not likely to significantly affect agriculturally important farmland and contribute to a cumulative impact.	No impact Phase 2 actions are not likely to significantly affect agriculturally important farmland and contribute to a cumulative impact.	No significant impact, assuming that the pipeline is constructed to avoid agriculturally important farmland. Phase 2 actions are not likely to significantly affect agriculturally important farmland and contribute to a cumulative impact.
➢ Agricultural Economics	No impact. Phase 2 actions are not likely to significantly affect agricultural productivity and contribute to a cumulative impact.	No significant impact. Phase 2 actions are not likely to significantly affect agricultural productivity and contribute to a cumulative impact.	No significant impact. Phase 2 actions are not likely to significantly affect agricultural productivity and contribute to a cumulative impact.	No impact Phase 2 actions are not likely to significantly affect agricultural productivity and contribute to a cumulative impact.	No impact. Phase 2 actions are not likely to significantly affect agricultural productivity and contribute to a cumulative impact.
Recreational Resources					
➢ Local and Regional Recreation	No significant effects on recreation.	Potential significant effects to recreation at Gulf of California discharge area. Potential beneficial effect to recreation at the Sea. May have potential significant impacts on recreation uses along the proposed pipeline route.	Recreation impact at point of discharge in Pacific not significant. Potential beneficial effect to recreation at the Sea. May have potential significant impacts on recreation uses along the proposed pipeline route.	Potential significant impact to off-road vehicle use in vicinity of Lake Palen. Potential beneficial effect to recreation at the Sea. May have potential significant impacts on recreation uses along the proposed pipeline route.	Beneficial impact on recreation users and facilities to the extent that the import of CASI water contributes to the improvement of salinity levels and stabilization of the Sea elevation.
Aesthetics					
➢ Visual Resources	Massing, bulk, and colors of expanded EES facility would result in moderate to strong visual contrasts with the existing desert landscape. This would be a significant and unmitigable visual effect.	Depending on their location, proposed pumping stations could have significant adverse visual effects.	Depending on their location, proposed pumping stations could have significant adverse visual effects.	Depending on their location, proposed pumping stations could have significant adverse visual effects.	Construction may cause short term impacts.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
➢ Odors	Beneficial odor effects would occur if reduced salinity improved the condition of the Sea, resulting in fewer algal blooms, fish kills, and avian kills.	Same as for Expanded EES.	Same as for Expanded EES.	Same as for Expanded EES.	Odors may improve through improved water quality
Public Health and Environmental Hazards					
➢ Biological Pathogens	The improved condition of the Sea may support greater concentrations of biological pathogens.	The improved condition of the Sea may support greater concentrations of biological pathogens.	The improved condition of the Sea may support greater concentrations of biological pathogens.	The improved condition of the Sea may support greater concentrations of biological pathogens.	The improved condition of the Sea may support greater concentrations of biological pathogens.
➢ Mosquito-borne Diseases	Construction may create water-filled depressions that could become encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans. The declining Sea level may reduce the amount of brackish marsh, which is encephalitis mosquito breeding habitat, leading to a reduction in the potential for transmission of mosquito-borne diseases to humans. Cumulative wetland development may increase encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans.	The declining Sea level may reduce the amount of brackish marsh, which is encephalitis mosquito breeding habitat, leading to a reduction in the potential for transmission of mosquito-borne diseases to humans. Cumulative wetland development may increase encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans.	The declining Sea level may reduce the amount of brackish marsh, which is encephalitis mosquito breeding habitat, leading to a reduction in the potential for transmission of mosquito-borne diseases to humans. Cumulative wetland development may increase encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans.	The declining Sea level may reduce the amount of brackish marsh, which is encephalitis mosquito breeding habitat, leading to a reduction in the potential for transmission of mosquito-borne diseases to humans. Cumulative wetland development may increase encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans.	No effects on mosquito-borne diseases. Cumulative wetland development may increase encephalitis mosquito breeding habitat, increasing the potential for transmission of mosquito-borne diseases to humans.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
➢ Chemical Hazards	Construction would increase the potential for accidental spills of petroleum products. Pumping Sea water likely would remove negligible amounts of selenium from the food chain. Wind erosion of exposed sediments and EES precipitants could result in airborne exposure to selenium and other Sea water constituents. Improved conditions at the Sea may attract more motorized watercraft users, increasing the potential for releases of petroleum products. Operation of the EES at Bombay Beach may expose visitors to airborne concentrations of salts and selenium; operation of the EES at the Salton Sea Test Base likely would not result in public exposure, due to the system's distance from populated areas.	If Mexico has no comprehensive waste management regulations, exporting Salton Sea water would be considered a nonmitigable significant adverse impact. Increased concentrations of chemicals in the Golfo de Santa Clara would be negligible and likely would not result in public health hazards. Pumping Sea water likely would remove negligible amounts of selenium from the food chain. Improved conditions at the Sea may attract more motorized watercraft users, increasing the potential for releases of petroleum products.	Increased concentrations of chemicals in the Pacific Ocean would be negligible and likely would not result in public health hazards. Pumping Sea water likely would remove negligible amounts of selenium from the food chain. Improved conditions at the Sea may attract more motorized watercraft users, increasing the potential for releases of petroleum products.	Exposed salts, selenium, and other constituents around the perimeter of the lake could result from evaporation. These materials could be subject to wind erosion; however, due to the lake's distance from populated areas, there would be no public exposure. High salinity and chemical concentrations in the Palen Dry Lakebed would not affect public health because access would be restricted. Pumping Sea water likely would remove negligible amounts of selenium from the food chain. Improved conditions at the Sea may attract more motorized watercraft users, increasing the potential for releases of petroleum products.	Because the chemical composition of the imported water is not known, it cannot be predicted whether this water would increase or decrease the presence of chemicals in the Sea.
Utilities and Public Services					
➢ Utilities (Water Service, Wastewater Service, Electricity, and Solid Waste Disposal Facilities)	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.
➢ Public Services (Traffic, Education, Police Service, and Fire Service)	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.	No significant impacts are anticipated.

Table 6.3-1
Summary of Potential Environmental Consequences of Phase 2 Export Alternatives *(continued)*

Resource	EES	Export to Gulf of California	Export to Pacific	Export to Palen	Import from Yuma
Cultural Resources					
➢ Archaeological and Architectural Resources	Potential significant impact on resources eligible for the NRHP. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on resources eligible for the NRHP. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on resources eligible for the NRHP. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on resources eligible for the NRHP. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on resources eligible for the NRHP. Combination with other proposed and ongoing projects may cause significant cumulative impacts.
➢ Native American Resources	Potential significant impact on ethnographic resources such as traditional cultural properties and traditional use areas. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on ethnographic resources such as traditional cultural properties and traditional use areas. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on ethnographic resources such as traditional cultural properties and traditional use areas. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on ethnographic resources such as traditional cultural properties and traditional use areas. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on ethnographic resources such as traditional cultural properties and traditional use areas. Combination with other proposed and ongoing projects may cause significant cumulative impacts.
➢ Paleontological Resources	Potential adverse impacts on significant paleontological resources. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential adverse impacts on significant paleontological resources. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential adverse impacts on significant paleontological resources. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential adverse impacts on significant paleontological resources. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential adverse impacts on significant paleontological resources. Combination with other proposed and ongoing projects may cause significant cumulative impacts.
Indian Trust Assets					
➢ Indian Trust Assets	Potential significant impact on Indian Trust Assets. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on Indian Trust Assets. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on Indian Trust Assets. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on Indian Trust Assets. Combination with other proposed and ongoing projects may cause significant cumulative impacts.	Potential significant impact on Indian Trust Assets. Combination with other proposed and ongoing projects may cause significant cumulative impacts.
Environmental Justice					
➢ Environmental Justice	No environmental justice issues are anticipated.	No environmental justice issues are anticipated.	No environmental justice issues are anticipated.		No environmental justice issues are anticipated.

6.3.1 Enhanced Evaporation System (EES)

A 150,000 af/yr capacity EES could be constructed as an export facility for either Alternative 1 or 5. This facility would be similar to the EES proposed for either Alternative 2 or 3. In addition, the 100,000 af/yr capacity considered for Phase 1 for Alternative 4 could be expanded to 150,000 af/yr capacity during Phase 2. In this case, the larger EES facility would be an expansion of the EES facility constructed during Phase 1. The area necessary for constructing the expanded system is contained within the original land areas designated for the Phase 1 EES. Pipelines and intakes constructed during Phase 1 would be sufficient to carry the additional flows necessary to operate the expanded system under this alternative. It is expected that constructing and operating the expanded EES facility would affect the environmental resources discussed below.

Surface Water Resources

Impacts of constructing an EES during Phase 2 for either Alternative 1 or 5 would be the same as those described in chapter 4, for a Phase 1 EES for Alternatives 2 and 3. For Alternative 1, with an expanded EES during Phase 2, the potential for release of brine from the collection and evaporation ponds would be increased, and the magnitude of a release in the event of an earthquake would be greater than with the smaller capacity system. The expanded EES would increase the number of treatment modules, and the volume of brine stored in the system. The maximum volume of liquid brine that could be released would be constant throughout the operational life of the system. A release is unlikely to result in a significant impact on water quality in the Salton Sea. The brine would be released over a large land area and would evaporate or seep into the ground before much of it could enter the Salton Sea. Perhaps the most significant effect would occur if some of the brine entered San Felipe Creek, since there it would quickly make the water in the creek change from fresh or brackish to hypersaline.

Ground Water Resources

The impacts would be of the same types described in Section 4.2, and are not expected to significantly increase the impacts already described.

Geology and Soils

Both the Calipatria Fault and the Coachella Branch of the San Andreas Fault extend through the Bombay Beach area. No known fault structures extend through the Test Base EES site. Seismic activity along these or other nearby faults could damage the system of interconnected towers that make up the EES, cause structural damage to the catchment basin, and rupture the intake pipe for the system. Repairs to structural damage would be made under the long-term operation and maintenance program for the Salton Sea Restoration Project, reducing the potential for these impacts to a less than significant level. The proposed Bombay Beach EES site may be subject to both wind and stream erosion. Construction and post-construction erosion-control measures would be developed to protect the soils surrounding the towers and catchment basin. These measures would minimize this impact to a less than significant level. Potentially corrosive soils could damage the intake pipe. Soils along the Sea margin are highly

saline, and salt resistant construction materials would be used to construct any subsurface structures in this area.

Air Quality

An EES facility would have construction and operational impacts similar to those described in Chapter 4. Construction requirements for the expanded EES have not yet been estimated, but significant grading activity and material transport would be required. Fugitive dust emissions from on-site construction activities might exceed Clean Air Act *de minimis* levels, requiring a Clean Air Act conformity review.

Operating the EES would result in the potential for significant salt spray drift downwind of the site. The geographic extent of areas exposed to salt drift would be greater than that described in Chapter 4. If buffer areas around the system were limited, spray drift to offsite areas might exceed Clean Air Act *de minimis* levels. Constructing and operating the EES would require air quality permits from the relevant air pollution control agency, such as the Imperial County Air Pollution Control District or South Coast Air Quality Management District.

Mitigation for these air quality impacts would be the same as described in Chapter 4. These measures include developing and implementing a dust control plan, using electrically powered pumps for facility operations, siting EES modules and incorporating buffer zones to reduce public exposure to salt drift, and using automated controls to shut down some or all EES modules when hourly average wind speeds exceed 14 to 16 mph. However, even with implementation of these measures, fugitive dust emissions during construction may not be able to be reduced to a less than significant level.

Avian Resources

Bird species would benefit from improved water quality conditions in the Sea and the reduced salinity levels. However, similar to impacts described in Chapter 4, constructing an expanded EES could have significant and unmitigable impacts on upland avian species. For example, loss of foraging and nesting habitat could affect some avian species and the EES waters could be toxic to birds landing in the EES ponds and ingesting contaminants when preening. Other hazards could occur from bird exposure to sprayed EES waters and from collision with the spray towers. However, compared to impacts described in Chapter 4, there would be an increase in the number of avian losses from tower collisions, particularly during the night, and from salt encrustation as they fly through the spray.

Vegetation and Wildlife

Constructing the EES would result in a potentially significant adverse impact to plant communities due to the loss of large amounts of desert habitat. There would also be adverse impacts to the surrounding vegetation from the salt spray blowing from the EES, which could kill plants or stunt growth and reproduction. In addition special status species such as the desert tortoise and the flat-tailed horned lizard could be impacted depending on the location of the additional EES facilities.

Socioeconomics

An EES module processing 25,000 acre-feet per year would cost about $50 million to construct and $1.6 million per year to operate and maintain (in 1999 dollars). At an inflation-adjusted discount rate of 3.5 percent per year, the present capitalized cost of constructing and operating one module for 100 years is about $91 million. A 4-module expansion would thus cost $364 million. Construction of the EES would result in short-term economic benefits from regional employment and spending. Operation and maintenance would also provide minor benefits from employment of operations staff and subsequent spending.

A faster decline in salinity, if accompanied by reduced eutrophication and other improvements in water quality, could promote a faster recovery in the recreational use of the Sea and associated commercial development. Therefore, this alternative could provide the economic benefit of increasing the present value of future benefits from recreational use of the Sea.

Visual Resources and Odors

Constructing and operating the EES would result in potentially significant and unavoidable visual impacts. The massing, bulk, and color of the proposed expanded EES facilities would result in moderate to strong visual contrasts with the existing desert landscape in the Basin, as seen from key viewing observation points. Mitigation measures have been identified to reduce the effects of these impacts, including painting facilities a color that blends with the immediate natural desert landscape, using non-reflective materials, and emphasizing horizontal lines in facility design (see Section 4.13 for detailed measures). However, proposed project impacts would still be considered significant even after implementing these measures.

Beneficial odor impacts would occur if water quality conditions improved at the Sea, resulting in fewer algal blooms, fish kills, and avian kills.

Public Health and Environmental Hazards

Construction activities may create depressions in the ground surface that could collect water, creating isolated pockets of standing water that could become breeding habitat for the encephalitis mosquito. The increase in habitat could lead to an increase in the mosquito population, increasing the potential for transmission of mosquito-borne diseases to humans. The use of heavy equipment and watercraft to construct the EES would increase the potential for accidental spills of petroleum products, primarily fuels and oils. Because the volume of any accidental spills compared to the volume of the Sea likely would be minimal, the potential for adverse health effects from exposure to petroleum products in Sea water is low.

As a result of operating the expanded EES, the chemical composition of the Sea would change, including a decrease in salinity, possibly increasing the survival rates of biological pathogens, leading to an increase in the potential health hazards associated with exposure to these pathogens. However, due to uncertainty about the future levels of these biological pathogens, the change in health effects related to their presence

cannot be accurately predicted. The reduction in Sea level may reduce the amount of shoreline brackish vegetation, which is breeding habitat for the encephalitis mosquito. This could cause a decline in the mosquito population, reducing the potential for transmission of diseases from mosquitoes to humans. Pumping Sea water, which contains relatively low selenium concentrations, to the expanded EES likely would remove negligible amounts of selenium from the food chain. However, if operating the expanded EES results in lower selenium concentrations in fish and waterfowl, it would have a beneficial effect on fish and duck consumers. Improving the condition of the fishery may attract a greater number of anglers to the Sea, increasing the size of the population exposed to selenium via consumption of fish. The decline in Sea elevation may expose contaminated sediments along the Sea's perimeter and increase the potential for public exposure to airborne contaminants due to wind erosion of the sediments. The EES precipitation ponds, containing the Sea water constituents following evaporation of the water, could dry out, creating the potential for wind erosion. Because the susceptibility of sediments and the pond materials to erosion is not known, the potential for airborne health hazards resulting from operating the enhanced EES cannot be determined. If conditions at the Sea improve as a result of this alternative, recreational use of the Sea likely would increase, leading to a greater number of people that would exposed to potential hazards at the Sea and to increased releases of petroleum fuels and oils from motorized watercraft. The volume of these releases compared to the volume of the Sea likely would be minimal; therefore, the potential for adverse health effects from exposure to petroleum products in Sea water is low.

Operation of the EES towers would create the potential for drift of the concentrated Sea water and its constituents. If the expanded EES is constructed at Bombay Beach, winds at speeds below the 14 mile per hour system shutdown threshold may be capable of carrying these materials to Bombay Beach. Visitors to the beach could be exposed to airborne concentrations of salts and selenium. If the expanded EES is constructed at the Salton Sea Test Base, it is not likely that the public would be exposed to airborne salts and selenium due to the distance from the EES to populated areas.

Archaeological and Architectural Resources

Ground-disturbing activities associated with the EES could have a significant adverse impact on resources eligible for the NRHP within the area of potential effect (APE). Once the APE for the EES expansion has been defined, an archaeological record search would need to be conducted of the area. A survey of all unsurveyed portions would also need to be conducted. Identified resources would be evaluated for eligibility to the NRHP. Impacts to NRHP-eligible resources could be mitigated through avoidance, construction monitoring, or data recovery. The appropriate mitigation measure would be determined in consultation with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

Ethnographic Resources

Ethnographic resources, such as traditional cultural properties (TCPs) and traditional use areas (TUAs), may be subject to adverse impacts from expanding the EES. Once

the APE for the EES has been defined, sensitive resources within the APE would need to be identified through consultation with the appropriate Native American group(s). Impacts to Ethnographic resources are best mitigated through avoidance. When avoidance is not possible, mitigation measures should be determined in consultation with the appropriate tribal group or groups.

Paleontological Resources

Ground-disturbing activities associated with the EES could have adverse impacts on significant paleontological resources within the project area. Once the extent of the EES has been defined, the potential for this area to contain significant resources would need to be evaluated. If the project area contains a high potential for significant paleontological resources, monitoring ground-disturbing activities by a qualified paleontologist may be required to mitigate potential impacts.

Indian Trust Assets

The EES could have a significant impact on Indian Trust Assets. Once the extent of the EES has been defined, Indian Trust Assets within this area would need to be identified and impacts assessed. Impacts to Indian Trust Assets are best mitigated through avoidance. When avoidance is not possible, mitigation measures should be determined in consultation with the appropriate Native American tribal group or groups.

6.3.2 Export to Gulf of California

This alternative would pump water directly out of the Salton Sea to the Gulf of California through an enclosed pipeline that terminates at Golfo de Santa Clara, immediately outside of the UN-designated Biosphere. Alternately, the outfall structure could be extended approximately a mile into the Gulf of California. The screened intake structure would use the same design as that described for the EES and would be offshore of the Salton Sea Test Base site. The 112-inch diameter pipeline would convey 250,000 af/yr, or 345 cfs, and would be constructed of polymer-lined steel. The pipeline route would extend 140 miles and would require two pumping stations to lift the water 453 feet. It is expected that constructing and operating the facility to pump water from the Salton Sea to the Gulf of California would affect the environmental resources discussed below.

Surface Water Resources

Constructing the export pipeline to the Gulf of California would involve minor local impacts on surface water resources from erosion along the construction corridor caused by storm water runoff. The potential for these impacts would be limited to locations where the pipeline route lies along or crosses a perennial stream channel. These impacts would be minor because the region is arid, most channels are dry most of the year, and most of the streams in the area carry relatively high sediment loads.

Discharging Salton Sea water into the Gulf of California could potentially result in a significant impact on the receiving water. The Salton Sea brine would be higher in the concentration of total dissolved solids than the receiving water, and the concentrations

of the individual dissolved and suspended constituents would differ from those in the receiving water. The Salton Sea water contains higher concentrations of nutrients than occur in the Gulf of California. In addition, Salton Sea water may contain organisms already adapted to saline conditions that are not found, or are not abundant, in the receiving water.

For the purposes of this analysis, the Upper Gulf of California extends from the mouth of the Colorado River a distance of about 40 miles south, or about as far as San Felipe. Within this region currents move relatively slowly and are part of a larger rotational system driven by winds, tides, and the shape of the shoreline. In the Upper Gulf, the rate of evaporation is greater than the rate of precipitation or inflow from streams. Therefore, wind and tidal change are the principal energy sources for moving water in the Upper Gulf. Tidal currents probably dominate, but tidal flushing is extremely slow in the Upper Gulf. It has been estimated that the waters of the Upper Gulf are exchanged at a rate of about once per year. This slow exchange with the larger circulation system of the Gulf in effect makes the Gulf act in some ways like a large lake. There is a natural salinity gradient in the Upper Gulf. The salinity in the vicinity of the mouth of the Colorado River is about 37,500 mg/L, and is about 2,000 mg/L lower in the main body of the Gulf, south of San Felipe. Adding salts or nutrients to this semi-closed system could cause the salts and nutrients to accumulate, much as they do in the Salton Sea.

The principal existing inflows to the Gulf of California in the region of the proposed Salton Sea outfall include Colorado River discharge, which contains agricultural return flows from irrigated lands in the U.S and Mexico, and saline agricultural wastewater discharge from the MODE Canal (the Wellton-Mohawk Drain in Yuma, Arizona). The MODE Canal does not discharge directly into the Gulf of California, but instead discharges into the upper portion of the Santa Clara Slough (Cienega de Santa Clara). Thus, the discharge rate of this water to the Gulf is governed by tidal action in the marsh. On its path to the Gulf, the water is able to spread out over a large area, where it mixes with water from the Gulf that move into the Santa Clara Slough on high tides. Nutrients and particulates are removed through biological processes and settling within the marsh. Based on historical records for 1979-1986, flows in the Wellton-Mohawk Drain at the Arizona-Sonora, Mexico border averaged about 200 cfs (about 144,000 AFY) (USGS 1999. Available from http://waterdata.usgs.gov/nwis-w/AZ). Salt concentrations in the MODE Canal are about 3,000 to 5,000 mg/L.

The water quality at the mouth of the Colorado River varies with the quantity of flow. Flows in the Colorado River at El Maritimo, about 48 miles downstream of the international boundary, reportedly range from nearly zero to several thousand acre-feet per year (Thomson et al. 1969). The concentration of salts in the discharge from the Colorado River is likely in the range of 3,000 to 5,000 mg/L on average. As flows increase, concentrations of dissolved constituents tend to be reduced by dilution and particulate loads tend to increase.

By contrast, the Salton Sea discharge would be a continuous, steady flow with a relatively stable constituent load. A rate of 250,000 AFY is approximately 345 cfs, or about two-thirds the rate of the MODE Canal. The concentration of the effluent would range from as low as 40,000 mg/L (assuming Alternative 4 with 1.06 mafy inflow), to 80,000 mg/L (assuming Alternative 1 with 0.8 mafy inflow). 40,000 mg/L is not much higher than the salt concentration in the Upper Gulf, which reportedly ranges between about 36,000 to 38,000 mg/L near El Golfo (Thomson et al. 1969). Thus, assuming that the effluent discharge rate would be about half the combined rates of the Colorado River and the MODE Canal combined, and that the average salt concentration in the existing inflows is on the order of on-tenth to one-twentieth the concentration of the Salton Sea effluent, the salt loading rate would be twenty to forty times higher than the loading rate of the existing inflows.

Discharging from a large number of small outfalls instead of from one large outfall could minimize the impacts on the receiving waters. This would allow the effluent to mix with the ambient water more rapidly over a large area, and would help to prevent stratification due to density differences. Thus, the principal water quality concerns would be the potential for large-scale salinity increases in the Upper Gulf, excessive nutrient loading, and potential acute toxic effects from chemical or biological constituents of the effluent. The later could also be minimized if the discharge were dispersed. Standard testing procedures could be used, or adapted, to monitor the toxicity of Salton Sea water to resident organisms, and to determine the appropriate discharge rates to achieve an appropriate degree of mixing.

Thomson et al. (1969) concluded that discharge of a large volume of brine (3.4 mafy) with a salinity of 45,800 mg/L into the Upper Gulf could create a hypersaline environment at the northern end of the Gulf. (3.4 mafy is approximately 13.4 times greater than the 250,000 AFY assumed in this report.)

Ground Water Resources

Export pipelines are not expected to leak. However, a failure of the pipeline could result in a temporary discharge of saline water. The size of a discharge due to a major failure in the pipeline has not been estimated. However, the pipeline is expected to be designed so that a leak would be detected and the flow shut off within a specified period of time. Such a discharge could have a significant local impact on ground water quality, depending on the location and duration of the release. Impacts on ground water are expected to be both unlikely to occur, and unlikely to be significant if they occur.

Geology and Soils

Known active faults that could be crossed by the proposed export pipeline include the Superstition Hills Fault and the San Jacinto Fault Zone. An approximate fault boundary extends northwestward from the northern edge of the Gulf of California and would be crossed by the proposed pipeline route. Earthquakes along these or other nearby faults could cause damage to the pipeline. Repairs to structural damage would be made under the long-term operation and maintenance program for the Salton Sea Restoration

Project, reducing the potential for these impacts to a less than significant level. Soil disturbance during pipeline construction would result in an increased potential for soil erosion. This impact is not expected to be significant due to the relatively level topography of much of the area crossed by the pipeline. In addition, construction and post-construction erosion-control measures would be implemented in areas where the pipeline crosses soils sensitive to wind and stream erosion. Potentially corrosive soils could damage the pipeline. Soils along the Sea margin are highly saline, and salt resistant construction materials would be used to construct any subsurface structures in this area.

Air Quality

Constructing an intake structure, 140 miles of pipeline, and two pumping plants could produce significant amounts of fugitive dust and vehicle emissions. Mitigation for this potential significant impact would require developing and implementing a dust control plan for construction sites, including haul roads and construction equipment staging areas. Furthermore, pumping plant operations probably would require air quality permits from the Imperial County Air Pollution Control District.

Noise

Constructing a pipeline from Salton Sea to the Gulf of California would result in temporary and intermittent noise effects along the length of the pipeline corridor. Noise would result primarily from earthmoving equipment and heavy truck traffic. Construction could raise noise levels over 80 dB in the immediate vicinity of the construction activity. However, noise levels would decrease with increasing distance from the construction site. Sensitive receptors have not been identified along the pipeline route, but any residences, schools, or other sensitive land uses near construction activities have the potential to be affected. Should construction cause a disturbance, limiting use of heavy construction equipment to normal daylight hours (7 AM to 7 PM) would reduce the effects of construction noise. Local city or county noise ordinances and guidelines may place additional restrictions on construction activities.

Fisheries and Aquatic Ecosystems

Potentially adverse impacts could occur to resident fish and benthic species and aquatic habitat in the Gulf of California due to the potential for further degradation of existing water quality problems. The upper Gulf of California is a relatively shallow body of water with poor circulation and lower dispersive potential. Consequently, the Gulf would have a limited ability to assimilate wastewaters. However, available information suggests that most deepwater outfalls, if designed and operated properly, can avoid any adverse environmental problems (Salton Sea Science Subcommittee 1999b) at least in a short term (i.e., less than twenty-five years) time frame. Limited information is available on the potential long-term consequences of disposal.

The Salton Sea Science Subcommittee is collecting information relative to all ocean-based export alternatives. The information from the outfall report will provide for a more detailed analysis in the immediate future.

Executive Order 13112 recently signed by President Clinton (February 3, 1999), states that introduction of invasive species (i.e., "an alien species whose introduction [export /import] does or is likely to cause economic or environmental harm") will not be allowed. This alternative would be contrary to the directive of this Executive Order. The possibility that Tilapia could be introduced into the Gulf of California would not be allowed under the authority of this Executive Order.

Avian Resources

Discharges from the Salton Sea to the Gulf of California may have significant impact to avian resources. As described above there is a potential to impacts aquatic resources including fish that may in turn affect fish eating birds.

Vegetation and Wildlife

Constructing a pipeline to the Gulf of California may have significant impacts to vegetation and wildlife. The pipeline could have an adverse impact to plant and wildlife communities, including sensitive species and habitats, due to the loss of habitat resulting from construction. The pipeline could impact local and/or regional wildlife migration routes. Once the route for the pipeline has been determined, it would need to be surveyed to determine if sensitive species or habitats could be affected. Impacts to these resources could be mitigated through construction monitoring and avoidance.

Socioeconomics

The Bureau of Reclamation has estimated that the operational cost to pump 100,000 to 400,000 acre-feet of water annually to be $6.6 to $26.4 million. Although the costs of pump and pipeline construction have not been precisely estimated, it is likely that such a system connecting the Salton Sea to a disposal site would cost upwards of $500 million. Total capitalized cost of construction and operation would likely be in the range of $0.7 to $1.2 billion.

If accompanied by reduction in eutrophication and other improvements in water quality, this alternative could result in benefits of substantial additional recreational use and commercial development.

Land Use and Planning

Constructing a pipeline extending from the Sea to the Gulf of California may have significant land use impacts. The proposed pipeline route would begin within El Centro County and cross the US/Mexico border into the states of Baja-California and Sonora. Although the route would avoid most urban and commercial uses, some uses near major highways could be affected. The majority of the route would be within desert or agricultural lands. Most of the route in the U.S would be within publicly withdrawn land (BLM and BOR) and private land. In Mexico, the route would mostly cross private land. The route mostly would follow existing road, canal, and railroad right-of-ways, and may be a compatible use in these areas. Land use compatibility would need to be evaluated for all affected jurisdictions once the final pipeline route is determined.

Agricultural Land Resources

A pipeline to transport water from the Sea to the Gulf of California may affect areas of agriculturally important lands in the Imperial Valley and lands in Mexico that may be comparable to those considered to be agriculturally important in California. Although the route in the US and Mexico mostly would be in desert areas, or would follow existing road, canal, and railroad right-of-ways, additional land in agricultural areas may still be necessary for construction. Once the final pipeline route is determined, the significance of agriculturally important farmland conversion would need to be evaluated using the LESA methodology. The area of farmland that may be influenced by this alternative is not likely to affect the agricultural economics of the area.

Recreational Resources

A determination of potential impacts to water quality and fisheries are required to ascertain potential recreation impacts to the Gulf of California discharge area. To the extent that this export alternative would contribute to stabilizing water quality, salinity levels, and water elevations in the Salton Sea, it would have a potentially beneficial impact on recreation uses and facilities at the Sea. However, potential effects on other recreational areas, facilities, or uses within the broader regional study area would need to be evaluated once the final pipeline route is determined.

Visual Resources and Odors

Depending on the location of the proposed pumping stations, sensitive visual receptors such as residences or recreationists could be adversely affected if the new stations create strong contrasts with the surrounding visual environment. Once the final location of pump stations is determined, the significance of this potential visual impact would need to be evaluated. Potential mitigation measures include painting and landscaping to reduce the level of contrast between the engineered features of the pump station and any adjacent natural features.

Public Health and Environmental Hazards

If Mexico has no comprehensive waste management regulations, then exporting Salton Sea water would be considered a nonmitigable significant adverse impact.

Pumping Salton Sea water, which contains various chemical constituents including selenium, to the Golfo de Santa Clara would increase the concentrations of those chemicals in the Golfo. Chemical concentrations would be highest near the pipeline outfall and would decrease with distance from the outfall. Because the concentrations of selenium and other chemicals in the Salton Sea are relatively low and these chemicals would be dispersed following discharge, it is not likely that they would present a potential hazard via the water or accumulation in fish; however, additional analysis and data gathering should be conducted to determine the level of potential health hazard, if any. Alternatively, extension of the outfall structure approximately one mile into the Gulf of California would further the distance the discharged water from populated areas. Biological pathogens likely would not survive being transported to the Golfo or the Gulf and, therefore, likely would not present a potential health hazard.

Exporting water from the Sea would reduce the levels of selenium in the water, possibly reducing selenium concentrations in fish and waterfowl, reducing the potential health hazard for fish and duck consumers. Improving the condition of the Sea may increase the survival rates and Sea levels of biological pathogens, increasing the potential for adverse health effects. If conditions at the Sea improve, recreational use of the Sea likely would increase, leading to a greater number of people that would exposed to potential hazards at the Sea and to increased releases of petroleum fuels and oils from motorized watercraft. The volume of these releases compared to the volume of the Sea likely would be minimal; therefore, the potential for adverse health effects from exposure to petroleum products in Sea water is low.

Archaeological and Architectural Resources

Ground-disturbing activities associated with constructing a pipeline from the Salton Sea to the Gulf of California could have a significant adverse impact on NRHP-eligible and other important resources located within the APE. Once the route for the pipeline has been determined, an archaeological record search would need to be conducted through the California Historical Resources Information System (CHRIS) and the Instituto Nacional de Antropología e Historia (INAH) of Mexico. Additionally, a survey of all unsurveyed portions of the APE would need to be conducted. Identified resources would be evaluated for eligibility to the NRHP or evaluated for significance based on Mexican law and INAH regulations. Impacts to NRHP-eligible or important resources could be mitigated through avoidance, construction monitoring, or data recovery. The appropriate mitigation measure should be determined in consultation with the SHPO, ACHP, INAH, and/or the Mexican government.

Ethnographic Resources

Ethnographic resources, such as TCPs and TUAs, may be subject to adverse impacts from constructing the pipeline from the Salton Sea to the Gulf of California. These impacts would be similar to those described for the EES; however, consultation must also be conducted with INAH and the Mexican government, and possibly with Mexican tribal groups in accordance with relevant Mexican laws and regulations, to identify ethnographic resources within APEs that lie in Mexico.

Paleontological Resources

Ground-disturbing activities associated with establishing a pipeline from the Salton Sea to the Gulf of California could have adverse impacts on significant paleontological resources within the project area. This impact would be similar to that described for the EES.

Indian Trust Assets

Constructing a pipeline from the Salton Sea to the Gulf of California could have a significant impact on Indian Trust Assets. This impact would be similar to that described for the EES.

6.3.3 Export to Pacific Ocean

This alternative would pump water directly out of the Salton Sea to the Pacific Ocean through an enclosed pipeline and tunnel that would terminate in Oceanside. The screened intake structure would use the same design as that described for the EES and would be offshore of the Salton Sea Test Base site. The 112-inch diameter pipeline would convey 250,000 acre-feet per year, or 345 cubic feet per second, and would be constructed of polymer-lined steel. It is expected that constructing and operating the facility to pump water from the Salton Sea to the Pacific Ocean would affect the environmental resources discussed below.

Surface Water Resources

The short-term effects of constructing the pipeline on surface water quality could include sediment discharge into perennial streams or other water bodies, or petroleum product spills or other materials associated with construction activity. The pipeline would cross or be routed near many streams, and disturbing stream channels or modifying land surfaces could alter runoff patterns. Effects could include locally increased flooding or erosion potential. These water quality and drainage effects are expected to be reduced to not significant levels by appropriate design and using best management practices during construction.

Although the general types of surface water impacts that may result from discharging Salton Sea water to the Pacific Ocean would be the same as described for the pipeline and discharge to the Gulf of California, the impacts are not expected to be significant. Along most of the Pacific Coast, including Oceanside, currents would be much more effective in dispersing effluent concentrations than in the Upper Gulf of California (Hickey 1979). No measurable increase in salinity of the receiving waters would be expected to occur beyond a distance of several tens of meters from the outfall.

Nutrient loading, and especially deposition of organic-rich solids, has been a concern of municipal wastewater discharges at some locations on the coast. However, the Salton Sea effluent would contain relatively low concentrations of suspended solids, and very small amounts of settleable solids compared to municipal wastewater. Similarly, the dissolved and suspended solids would not significantly reduce the dissolved oxygen content of the receiving waters. The receiving waters of the Pacific are high in dissolved oxygen, oxygen is replenished rapidly by wave action and photosynthesis, and dissolved oxygen concentrations are generally high within the potential depth range of the effluent outfall under existing conditions (Lynn et al. 1982).

The discharge rate of the Salton Sea effluent pipeline would be negligible compared to the bulk rate of water movement past the outfall in the ocean. The addition of dissolved nutrients at the concentrations of the Salton Sea would represent a negligible increase relative to ambient nutrient loads in the ocean (Thomas and Siebert 1974). Therefore, the effects of the discharge on ocean water quality are expected to be insignificant within a short distance of the outfall.

Ground Water Resources

The impacts of a failure of the pipeline would be similar to the impacts described above for the export pipeline to the Gulf of California. The pipeline to the Pacific would cross more riparian areas than the pipeline to the Gulf, and a discharge of saline water would have a greater probability of significantly impacting ground water resources. A pipeline failure would have a low probability of occurrence, but a high probability of causing a significant impact if it occurred.

Geology and Soils

Export to the Pacific Ocean would encounter the same types of seismic impacts and impacts related to corrosive soils as described for the pipeline to the Gulf of California. Soil disturbance during pipeline construction would increase the potential for soil erosion. The pipeline to the Pacific Ocean would cross areas with steep slopes and relatively substantial topographic relief west of the Sea. Implementing construction and post-construction erosion-control measures in areas where the pipeline crosses steep or unstable slopes or soils sensitive to wind and stream erosion would minimize this impact.

Air Quality

Potential air quality impacts associated with constructing an intake structure, pumping stations, and a pipeline from the Salton Sea to the Pacific Ocean would be the same as those described for export to the Gulf of California in Section 6.3.2. Furthermore, pumping plant operations probably would require air quality permits from the San Diego Air Pollution Control District.

Noise

Noise impacts from constructing a pipeline from the Salton Sea to the Pacific would be similar to those described for export to the Gulf of California.

Fisheries and Aquatic Ecosystems

Impacts to fisheries would be similar to those described for export to the Gulf of California, though discharge to the Pacific ocean would be less difficult because the physical oceanographic conditions along the southern California Coast are expected to facilitate rapid and thorough mixing and subsequent dispersion of Salton Sea effluent. Deepwater outfalls can provide much more rapid and thorough wastewater mixing and dispersion compared to relatively shallow-water outfalls. However, the possibility that Tilapia could be introduced into the Pacific would not be allowed under the authority of Executive Order 13112.

Vegetation and Wildlife

Impacts to vegetation and wildlife would be similar to those described for export to the Gulf of California and would be significant and mitigable.

Socioeconomics

Impacts would be similar to those described for export to the Gulf of California.

Land Use and Planning

Constructing a pipeline extending from the Sea to the Pacific Ocean near Oceanside, California may have significant land use impacts. The proposed route would be within Imperial and San Diego counties. The pipeline route would pass through land under a wide variety of ownership and administration including, for example, land administered by federal (BLM and USFS), state (California Department of Parks and Recreation), and local agencies, tribal land, and private land. A large portion of the pipeline would be underground and would not affect surface land uses. A majority of the land along the route would be public land managed for multiple use. Urban and commercial uses would be limited to small communities along the route and to the more developed area near the Ocean, or in developed areas adjacent the proposed right-of-way along Interstate 15 or State Route 76. Sections of the pipeline route may be within existing rights-of-way and may be a compatible use. Pipeline construction is likely to be incompatible with some land uses along the route. Land use compatibility would need to be evaluated for all affected jurisdictions once the final pipeline route is determined.

Agricultural Land Resources

The majority of this route would be through BLM, USFS, and CDPR lands. Small areas of agriculturally important farmland in western California could be affected, depending on the exact location of the pipeline corridor. Although this alternative is not likely to significantly affect agriculturally important farmland or agricultural economics, if it is determined that agriculturally important farmland is within the right-of-way, the significance of agriculturally important farmland conversion would need to be evaluated using the LESA methodology.

Recreational Resources

It is assumed that potential recreation-related impacts associated discharge in the Pacific Ocean would be negligible or insignificant. To the extent that this export alternative would contribute to stabilizing water quality, salinity levels, and water elevations in the Salton Sea, it would have a potentially beneficial impact on recreation uses and facilities at the Sea. However, potential effects on other recreational areas, facilities, or uses within the broader regional study area would need to be evaluated once the final pipeline route is determined.

Visual Resources and Odors

Potential visual impacts associated with constructing and operating pumping stations along the proposed pipeline route would be similar to those described for export to the Gulf of California in Section 6.3.2.

Public Health and Environmental Hazards

Pumping Salton Sea water, which contains various chemical constituents including selenium, to the Pacific Ocean would increase the concentrations of those chemicals in the ocean. Chemical concentrations would be highest near the pipeline outfall and would decrease with distance from the outfall. Because the concentrations of selenium and other chemicals are relatively low in the Salton Sea and these chemicals would be dispersed following discharge, it is not likely that they would present a potential hazard

through contact with the water or accumulation in fish; however, additional analysis and data gathering should be conducted to determine the level of potential health hazard, if any. Biological pathogens likely would not survive being transported to the Pacific Ocean and, therefore, likely would not present a potential health hazard.

Exporting water from the Sea would reduce the levels of selenium in the water, possibly reducing selenium concentrations in fish and waterfowl, reducing the potential health hazard for fish and duck consumers. Improving the condition of the Sea may increase the survival rates and Sea levels of biological pathogens, increasing the potential for adverse health effects. If conditions at the Sea improve, recreational use of the Sea likely would increase, leading to a greater number of people that would exposed to potential hazards at the Sea and to increased releases of petroleum fuels and oils from motorized watercraft. The volume of these releases compared to the volume of the Sea likely would be minimal; therefore, the potential for adverse health effects from exposure to petroleum products in Sea water is low.

Archaeological and Architectural Resources

Ground-disturbing activities associated with constructing a pipeline from the Salton Sea to Oceanside could have a significant adverse impact on NRHP-eligible resources within the APE. This impact would be similar to that described for the EES.

Ethnographic Resources

Ethnographic resources, such as TCPs and TUAs, may be subject to adverse impacts from constructing the pipeline from the Salton Sea to Oceanside. These impacts would be similar to those described for the EES.

Paleontological Resources

Ground-disturbing activities associated with establishing a pipeline from the Salton Sea to Oceanside could have adverse impacts on significant paleontological resources within the areas of disturbance. This impact would be similar to that described for the EES.

Indian Trust Assets

Constructing a pipeline from the Salton Sea to Oceanside could have a significant impact on Indian Trust Assets. This impact would be similar to that described for the EES.

6.3.4 Export to Palen Dry Lakebed

This alternative either would pump water directly out of the Salton Sea or would pump concentrated brine water to the Lake Palen dry lakebed through an enclosed pipeline. The screened intake structure would use the same design as that described for the EES and would be offshore of the Bombay Beach site. The 112-inch diameter pipeline would convey 250,000 acre-feet per year, or 345 cubic feet per second, and would be constructed of polymer-lined steel. It is expected that constructing and operating the facility to pump water from the Salton Sea to the Lake Palen dry lakebed would affect the environmental resources discussed below.

Surface Water Resources

The short-term impacts on surface water of construction of a pipeline would be minimal, as described for the pipeline to the Gulf of California, because of the arid regional climate.

The impacts on surface water resources at Palen Lake are likely to be significant. Palen Lake is a dry lakebed, somewhat typical of the small terminal lakes in isolated basins throughout the region. Evaporation on the basin floor exceeds the inflow rate from the surrounding watershed. Annual rainfall in the region of Palen Lake is about 3 inches on the basin floor and up to about 5 to 6 inches in the surrounding ranges, but annual runoff to the valley floor is probably less than one-half inch per year (Hely and Peck 1964).

The evaporation rate on the basin floor at Palen Lake is probably a little higher than at the Salton Sea (Hely and Peck 1964), but for the purposes of this analysis, they can be assumed to be equal. The initial evaporation rates of the brine would be in the range of 5.5 feet per year, but would rapidly decrease to about 4.6 feet per year as the salinity of the water reaches its saturated concentration of about 260,000 mg/L. Therefore, it can be assumed that most of the time the evaporation rate would be 4.6 feet per year.

Once the saturation concentration is reached in the pond, salt would precipitate at the rate at which it is imported in the inflow. The water exported to Palen Lake would initially have a salinity of anywhere from 40,000 mg/L to 85,000 mg/L, depending on which Phase 1 alternative is assumed. Over time it would decrease as the salinity of the Sea is reduced.

Based on a pump-out rate from the Sea of 250,000 AFY, the evaporation pond would eventually rise to an elevation at which the surface area is 54,348 acres (85 square miles). It would take many years for the lake to reach this size since the basin is relatively flat and wide.

The amount of salt that must be removed from the Sea to reach the target salinity would vary depending upon the initial conditions at the beginning of Phase 2, and how much the current inflow may be reduced in the future. Assuming that the target salinity is met, that the target elevation is achieved as nearly as possible, and that supplemental water is available during Phase 2 from the sources described earlier in this section, the amount of salt that would be disposed at Palen Lake over the 70 year study period of Phase 2 would range from about 360 million tons (Alternative 4 with inflow reduced to 1.06 mafy) to 622 million tons (Alternative 4 with inflow reduced to 0.8 mafy).

Assuming that the specific gravity of the solid salt is about 2.5, the volume of the salt estimated above would be create a salt cake averaging about 2 to 3 feet thick over an area of about 85 square miles. In addition to salt, particulate matter would also be co-deposited with the salt. The particulate matter might increase the thickness of the deposits two- or three-fold.

Palen Lake is in the upper portion of the gradually-southeast sloping Chuckwalla Valley. The lowest elevation on Palen Lakebed is about 427 feet msl. The land rises slightly near the foot of the Palen Mountains, and then continues to slope downward, between the mountains and Interstate 10, until it reaches the deepest part of Chuckwalla Valley, at Ford Dry Lake. The ridge separating Palen Dry Lake from the lower part of Chuckwalla Valley is only one or two feet above the deepest point in Palen Lakebed. Therefore, the Palen Lakebed topography would prevent water from being stored there. A dam would be required to retain the water in the Palen Lake portion of the valley. The height of the dam would depend upon the topography of the Palen Lake basin, but it is likely to need to be at least 15 to 20 feet high to accommodate the expected volume of water, salt, and sediment, plus storm runoff.

Among the surface water impacts of this export alternative would be impacts associated with dam failure, lateral seepage of saline water through the sandy alluvial sediments on the margins of the valley, and potential effects on the quality of water in the washes downgrade from Palen Lake. While these washes carry only occasional flows, the water quality may be relatively high and may support vegetation and wildlife. A large saline lake could create salt springs down gradient of the dam. A failure of the dam could have significant impacts due to flooding of portions of the lower Chuckwalla Valley, and would leave a salt residue that would continue to be transported toward Ford Dry Lake.

Ground Water Resources

The impacts of a pipeline failure on ground water resources would be similar to those described for the pipeline to the Gulf of California.

Since this alternative requires a discharge to land, there is likelihood for ground water to be impacted at the discharge site in Palen Lake. Palen Lake is a playa lakebed. The ground water underlying the central portion of the basin is expected to be saline. However, based on evaluation of the topographic map of the area, it appears that Palen Lake is not the terminal lake of Chuckwalla Valley. Groundwater flow may continue toward the Ford Dry Lakebed to the southeast. A subsurface hydrologic barrier is suspected at the southeast end of Palen Lake, possibly a bedrock extension of the Palen Mountains. Such a subsurface feature may serve to restrict the flow of ground water to the southeast, except when the water table is sufficiently high to flow over the barrier. And surface flows toward Ford Dry Lake are suspected to occur whenever the surface of Palen Lake is higher than about two feet. Because of the potential for ground water and surface water to move in the direction of Ford Dry Lake, and thus limit the accumulation of salts, it is possible that the quality of ground water beneath or in the general vicinity of Palen Lake is better than expected for a typical terminal lake. If so, placing brine on the lakebed could result in significant degradation of the existing ground water quality upgradient of Ford Dry Lake.

Geology and Soils

Export to Lake Palen would encounter the same types of geologic impacts as described for the pipeline to the Gulf of California (see Section 6.3.2).

Air Quality

Potential air quality impacts associated with constructing an intake structure, pumping stations, and a pipeline from the Salton Sea to Lake Palen in Riverside County would be the same as those described for export to the Gulf of California in Section 6.3.2. Furthermore, pumping plant operations probably would require air quality permits from the applicable air pollution control district, such as Imperial County Air Pollution Control District, South Coast Air Quality Management District, or Mojave Desert Air Quality Management District.

Noise

Noise impacts from constructing a pipeline from Salton Sea to Lake Palen would be similar to but less than those described for export to the Gulf of California or the Pacific because the pipeline distance would be shorter and through less developed and less noise-sensitive areas.

Avian Resources

There is the potential for a significant adverse impact on birds if Lake Palen becomes filled. This event could create conditions for an outbreak of avian botulism that occurred the last time water filled Lake Palen.

Vegetation and Wildlife

Potential significant adverse impacts to vegetation and wildlife would be similar to those described for export to the Gulf of California. In addition, this alternative would have an overall adverse impact to vegetation and wildlife species due to flooding at Lake Palen.

Socioeconomics

Impacts would be similar to those described for export to the Gulf of California.

Land Use and Planning

Constructing a pipeline from the Sea to Lake Palen may have significant land use impacts. Land along the proposed route is entirely within Riverside County and is mostly public land administered for multiple use. The route may also pass through the Chocolate Mountains Gunnery Range administered by the US Marine Corps, the Salton Sea Recreation Area administered by the California Department of Parks and Recreation, and private land. This area is very sparsely populated and little or no urban or commercial uses are likely to be affected. Land use compatibility would need to be evaluated for all affected jurisdictions once the final pipeline route is determined.

Recreational Resources

Depending on the rate of discharge and evaporation/absorption rates at Lake Palen, water discharge could impact existing off-road vehicle use areas in the vicinity. To the extent that this export alternative would contribute to stabilizing water quality, salinity levels, and water elevations in the Salton Sea, it would have a potentially beneficial impact on recreation uses and facilities at the Sea. However, potential effects on other

recreational areas, facilities, or uses within the broader regional study area would need to be evaluated once the final pipeline route is determined.

Visual Resources and Odors

Potential visual impacts associated with constructing and operating pumping stations along the pipeline route would be similar to those described for export to the Gulf of California in Section 6.3.2.

Public Health and Environmental Hazards

Because the body of water created by pumping Salton Sea water to the Palen Dry Lakebed would have no outlet and would be subjected to high evaporation rates, it would have high salinity and concentrations of chemicals, including selenium, greater than in the Salton Sea. As the water evaporates, the chemical constituents of the water may be left behind in a perimeter crust surrounding the water body. These chemicals may be subject to wind erosion; however, due to the lake's distance from populated areas, it is not likely to result in exposure of people to airborne hazards. Because there would be no public access to the lake, there would be no other public health effects associated with the lake. The effects of pumping concentrated brine would be similar to the effects of pumping Salton Sea water. However, due to the increased contaminant concentrations in the concentrated brine, salinity and chemical concentrations in the lake would be greater.

Exporting water from the Sea would reduce the levels of selenium in the water, possibly reducing selenium concentrations in fish and waterfowl, reducing the potential health hazard for fish and duck consumers. Improving the condition of the Sea may increase the survival rates and Sea levels of biological pathogens, increasing the potential for adverse health effects. If conditions at the Sea improve, recreational use of the Sea likely would increase, leading to a greater number of people that would exposed to potential hazards at the Sea and to increased releases of petroleum fuels and oils from motorized watercraft. The volume of these releases compared to the volume of the Sea likely would be minimal; therefore, the potential for adverse health effects from exposure to petroleum products in Sea water is low.

Archaeological and Architectural Resources

Ground-disturbing activities associated with constructing a pipeline from the Salton Sea to Lake Palen could have a significant adverse impact on NRHP-eligible resources located within the APE. This impact would be similar to that described for the EES.

Ethnographic Resources

Ethnographic resources, such as TCPs and TUAs, may be subject to adverse impacts from constructing the pipeline from the Salton Sea to Lake Palen. These impacts would be similar to those described for the EES.

Paleontological Resources

Ground-disturbing activities associated with establishing a pipeline from the Salton Sea to Lake Palen could have adverse impacts on significant paleontological resources

within the areas of disturbance. This impact would be similar to that described for the EES.

Indian Trust Assets

Constructing a pipeline from the Salton Sea to Lake Palen could have a significant impact on Indian Trust Assets. This impact would be similar to that described for the EES.

6.4 IMPORT WATER THROUGH YUMA, ARIZONA

This alternative would involve pumping reject water from a water treatment facility from Yuma to the Salton Sea. The water would be brought from the Central Arizona Salinity Interceptor (CASI), designed to transport brackish water by gravity from the Tucson and Phoenix areas to Yuma. This water would be less saline than existing inflows to the Sea and would help reduce salinity and stabilize elevation if inflows are significantly reduced. This water is expected to be available in approximately 25 years with the current plans for disposal including discharge to the Gulf of California. Approximately 304,800 acre-feet per year are estimated to become available for diversion to the Salton Sea. This amount of CASI water could be conveyed continuously at approximately 420 cfs. Due to water quality issues, this water cannot be mingled with Colorado River water and thus would require construction of a new canal or pipeline to convey the CASI water to the Salton Sea. It is anticipated that this conveyance structure would parallel the existing All American canal. It is expected that importing water through Yuma, Arizona would affect the environmental resources discussed below.

Surface Water Resources

Importing water from the CASI project would have the beneficial impact of helping to restore the Salton Sea while possibly preventing or reducing the potential adverse effects of its disposal in the Gulf of California.

The quality of this water is not known, but is expected to have a salt concentration of about 5,000 mg/L. While this is considerably higher than most of the other inflow sources being considered, it would still benefit the Sea because the salt concentration would be about seven times lower than the target salinity of the Sea. Among the potential adverse impacts of importing CASI water would be the effect of any trace elements, such as selenium, nutrient concentrations, or pesticide and herbicide residues that may be concentrated in the water.

Ground Water Resources

No impacts on groundwater are expected to occur from the transfer of CASI water by canal or pipeline.

Geology and Soils

The geology and soils impacts due to pumping treated water from Yuma to the Salton Sea would be similar to those discussed for the export alternatives. Soil disturbance during channel construction would result in the increased potential for soil erosion.

However, the relatively level topography of the area and implementation of construction and post-construction erosion-control measures where soils sensitive to wind and stream erosion are crossed would minimize this to a less than significant level.

Potentially significant structural impacts to the canal due to ground rupture and ground acceleration would be minimized to a less than significant level through the repairs and maintenance conducted as part of the Salton Sea Restoration Project.

Socioeconomics

The costs of this alternative cannot be estimated this time. It can be anticipated, though, that construction costs should be comparable to those of water-export schemes. Also, operating expenses should be less than those of water export schemes, as gravity flow would reduce power requirements for pumping water import.

Importing water would economically benefit the immediate area around the Sea, by preventing a substantial change in shoreline location and configuration.

Positive socioeconomic benefits are expected from employment and material purchases during the construction phase. During the operational phase, this measure would be expected to contribute to the overall economic benefit of the restoration program. In addition, operation and maintenance of the canal may create new positions for permanent employees.

Air Quality and Noise

Air quality and noise effects are expected to be minor. Standard construction practices would be employed to control air emissions and noise due to construction. No operational air quality or noise impacts are expected. Air quality permits may be required to operate pumping plants that may be needed to transport water to the Salton Sea.

Fisheries and Aquatic Ecosystems, Avian Resources, and Vegetation and Wildlife

Effects on fisheries, bird species and other biological resources are expected to be beneficial due to stabilization of shoreline and reduced salinity.

Land Use and Planning and Agricultural Resources

This action is not expected to affect land use and planning or agricultural resources. Constructing a transport canal adjacent to the All American Canal may have significant land use impacts. While the portions of the route would be in desert lands and would parallel the existing right-of-way for the All American Canal, commercial and public uses near major highways and agricultural uses could be affected. Most of the route would be within publicly withdrawn land (BLM and BOR) and private land. Land use compatibility would need to be evaluated for all affected jurisdictions once the final pipeline route is determined.

Constructing a transport canal adjacent to the All American Canal may affect areas of agriculturally important lands in the Imperial Valley. Although the route mostly would be in desert areas, or would parallel the existing right-of-way for the All American Canal, additional land in agricultural areas may still be necessary for construction. Once the final pipeline route is determined, the significance of agriculturally important farmland conversion would need to be evaluated using the LESA methodology. The area of farmland that may be influenced by this alternative is not likely to affect the agricultural economics of the area.

Recreational Resources

To the extent that this import alternative would contribute to the overall improvement of Salton Sea salinity levels and to the stabilization of the water surface elevation, it is viewed as having a potentially beneficial impact on recreation users and facilities.

Visual Resources and Odors

This action could result in short term visual impacts during construction of the pipeline from Yuma to the Salton Sea but would not result in permanent impacts to visual resources. Imports of CASI water could contribute to an overall improvement of odors at the Sea through improved water quality.

Public Health and Environmental Hazards

Introducing treated water to the Sea may dilute concentrations of chemical constituents present in the Sea water. A reduction in the selenium concentration may reduce the presence of selenium in the food chain, resulting in beneficial impacts to fish and duck consumers. However, because the chemical composition of this water is not known, the water could contain selenium and other constituents. These constituents could be concentrated by evaporation as the water is transported to the Sea, creating a new inputs to the Sea.

Utilities and Public Services

No significant impact.

Archaeological and Architectural Resources

Conveyance of water from Yuma, Arizona to the Salton Sea would require construction of a new canal that would parallel the All American Canal. Ground-disturbing activities associated with the construction of the canal have the potential to affect cultural resources. Prior to construction, compliance with Section 106 of the National Historic Preservation Act must be accomplished. This includes the identification and evaluation of any cultural resources within the APE of the proposed canal, and the development of mitigation measures in consultation with SHPO and ACHP.

Ethnographic Resources

Construction of a new canal could adversely effect ethnographic resources in the canal vicinity, including Pilot Knob. Consultation with the Quechan, Cocopah, and any other Native American group with religious or cultural connections to the areas encompassing the proposed route of the new canal should be conducted prior to

commencing any construction activities to identify all ethnographic resources, including TCPs and TUAs within the APE. Mitigation measures for impacts to Pilot Knob or other ethnographic resources would have to be developed in consultation with the appropriate Native American groups.

Paleontological Resources

Ground-disturbing activities associated with construction of a new canal from Yuma to the Salton Sea could have adverse impacts on significant paleontological resources within the APE. This impact would be similar to that described for the EES.

Indian Trust Assets

Construction of a new canal from Yuma, Arizona to the Salton Sea could adversely affect Indian Trust Assets on Fort Yuma. Consultation with the Ft. Yuma Quechan and the Cocopah may be required before construction activities commence to identify and assess impacts. Impacts to Indian Trust Assets are best mitigated through avoidance. When avoidance is not possible, mitigation measures should be determined in consultation with the appropriate Native American tribal group or groups.

Environmental Justice

Construction of a new canal from Yuma, Arizona to the Salton Sea could have adverse impacts on Indian Trust Assets of the Quechan and Cocopah, two minority populations.

6.5 CUMULATIVE IMPACTS

Phase 2 actions would be implemented around the year 2030. It is difficult to forecast what other projects may be implemented that could have cumulative effects beyond those discussed here, when combined with Phase 2. No projects have been identified in the immediate Salton Sea area that would cause additional impacts. It is possible that other projects in the vicinity of the export and import pipelines could cause some cumulative effects, as discussed below.

Surface Water Resources

The combination of reductions in flows through the Colorado River and increased conservation and irrigation efficiency throughout the Colorado River Delta region, plus the continuation of discharges through the MODE Canal, may increase the severity of salinity impacts on the waters of the Upper Gulf of California. Discharging Salton Sea water to the Pacific Ocean would add incrementally to the discharges from various point and non-point sources along the coast, both existing and planned. The effects of the Salton Sea's contribution to these cumulative effects is not likely to be significant due to the capacity of the Ocean to dilute salts and nutrients.

Importing CASI water to the Salton Sea would contribute to a beneficial cumulative impact on the waters of the Gulf of California by providing an alternative, higher use of the water. If the wastewater were diverted to the Salton Sea instead of to the Colorado

River Delta, the CASI project would reduce the net quantity of salts transported into the Delta. This benefit would come at the expense of increasing the salt loading to the Salton Sea basin, but would benefit the Salton Sea restoration objectives.

Ground Water Resources

The project alternatives are not likely to contribute to any significant impacts on ground water resources, in combination with other existing or foreseeable projects, other than the impacts discussed above.

None of the proposed Phase 2 conditional actions is expected to contribute to an adverse impact when viewed in combination with other existing or foreseen projects in the study area.

Land Use and Planning and Agricultural Resources

Because of the large scale of Phase 2 export and import alternatives, these actions may significantly contribute to cumulative land use impacts. The contribution of each alternative is likely to be fairly small in most cases unless significant development begins to occur in the affected areas. Export to the Pacific Ocean is most likely to significantly contribute to cumulative land use impacts because of its route through heavily developed areas near the Ocean.

Phase 2 actions are not likely to significantly affect agriculturally important farmland or agricultural productivity and contribute to a cumulative impact.

Public Health and Environmental Hazards

Constructing the Lewis Drain Treatment Facility would remove selenium, nutrients, and pesticides from agricultural wastewater, possibly the concentration of these chemicals in the Sea. The Brawley Wetlands Construction Project and Brawley Wetlands Research Facility would remove contaminants from agricultural wastewater and the New River, thus reducing the contaminant loading and possibly reducing concentrations in the Sea. The potential reduction in selenium levels entering the Sea resulting from the cumulative projects may reduce selenium in fish and waterfowl, resulting in beneficial health effects for fish and duck consumers. The wetlands projects likely would increase breeding habitat for the encephalitis mosquito, thus increasing the potential for transmission of diseases from mosquitoes to humans.

Cultural Resources

Significant cumulative impacts could occur to archaeological resources within the Salton Sea Basin from any of the export and import alternatives when considered together with other projects currently underway or proposed in the region. Any ground disturbance has the potential to disturb or destroy archaeological resources. The loss of these non-renewable resources, and the information that they may contain, may result in a significant cumulative impact on the resource base of the region.

Significant cumulative impacts also could occur to ethnographic resources within the Salton Sea Basin from any of the export and import alternatives when considered

together with other projects underway or proposed in the region. Any ground disturbance or new construction has the potential to disturb or destroy sensitive ethnographic resources. The loss of these non-renewable resources, or decreased access to resources by Native American groups, may result in a significant cumulative impact on the affected resource(s).

Indian Trust Assets

Significant cumulative impacts also could occur to Indian Trust Assets located on tribal reservations within the Salton Sea Basin from any of the export and import alternatives when considered together with other projects underway or proposed in the region. Any ground disturbance or new construction has the potential to disturb or destroy Indian Trust Assets such as mineral or cultural resources. The loss of these non-renewable resources may result in a significant cumulative impact on the affected resource(s).

Paleontological Resources

Significant cumulative impacts could occur to paleontological resources within the Salton Sea Basin from any of the export and import alternatives when considered together with other projects currently underway or proposed in the region. Any ground disturbance has the potential to disturb or destroy paleontological resources. The loss of these non-renewable resources, and the information that they may contain, may result in a significant cumulative impact on the resource base of the region.