STATE OF CALIFORNIA -- THE RESOURCES AGENCY

PETE WILSON, *Governor*

CALIFORNIA COASTAL COMMISSION

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January 8, 2002

Jack Fancher
U.S. Fish and Wildlife Service
2730 Loker Avenue West
Carlsbad, CA 92008

Subject: Consistency Determination CD-061-01 (Bolsa Chica Lowlands Restoration, Orange County).

Dear Mr. Fancher:

On January 7, 2002, the California Coastal Commission approved the proposed findings for the above-referenced consistency determination for restoration of the Bolsa Chica Lowlands. Previously, on November 13, 2001, the Commission found the project consistent to the maximum extent practicable with the California Coastal Management Program (CCMP). The findings approved yesterday support the November action taken by the Commission. Please contact me at (415) 904-5288 should you have any questions regarding this matter.

Sincerely,

Larry Simon

Larry Simon
Coastal Program Analyst

STATE OF CALIFORNIA—THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

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PROPOSED FINDINGS

ON CONSISTENCY DETERMINATION

Consistency Determination No.	CD-061-01
Staff:	LS/LE/JD/AW-SF
File Date:	6/28/2001
60th Day:	8/27/2001
75th Day:	extended through 11/30/2001
Commission Vote:	11/13/2001
Hearing on Findings:	1/7/2002

FEDERAL AGENCY: **U.S. Fish and Wildlife Service**

PROJECT LOCATION: Bolsa Chica Lowlands, Orange County **(Exhibits 1-3).**

PROJECT DESCRIPTION: Construction of wetland restoration project. Approximately 366.5 acres would be restored to full tidal influence, 200 acres would receive muted tidal influence via culverts to the full tidal area, 120 acres would be left unchanged as seasonal pond habitat, and 252 acres would be reserved as a future full tidal area once oil field operations terminate in 15-20 years. Project includes buying out and abandoning oil wells located on a portion of the acquired Lowlands property and on the adjacent State Ecological Reserve, dredging 2.7 million cu.yds. of material to create a tidal basin, constructing an earthen berm around the perimeter of the basin except where adjacent to the flood control channel levee, constructing an ocean inlet to the basin, constructing a Pacific Coast Highway bridge (including pedestrian and bicycle lanes separate from vehicle traffic lanes) and an oil field access bridge over the ocean inlet, constructing a French drain between project wetlands and existing residential development, and disposing dredged materials to create the basin berm, PCH bridge approaches, bird nesting islands, and to pre-nourish the beach and offshore ebb bar. Construction would take approximately three years. The project includes provisions for operation, maintenance, monitoring, and remediation of project components.

PREVAILING COMMISSIONERS: Commissioners Dettloff, Allgood, Kruer, McClain-Hill, McCoy, Orr, Rose, and Chairman Wan.

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STAFF NOTE:

These proposed findings incorporate the changes made to the "Staff Report and Recommendation on Consistency Determination" by the Commission at its November 13, 2001, meeting. The staff report prepared for that meeting recommended objection to the consistency determination based on both a lack of information and inconsistency with the development policies of the California Coastal Management Program (CCMP). The changes to the findings that support the Commission's vote to concur with the consistency determination are found on the following pages:

Page 11: Project elements expanded to include a four-year maintenance dredging and disposal program for the ocean inlet.

Pages 21-22: Change in the Recommendation and Resolution.

Pages 26-27: Project modifications that describe the type of dredged material that would be disposed in the nearshore zone and on adjacent beaches, and that commit the Service to submit to the Commission for its review the final sediment dredging and disposal plan.

Pages 34-36: Describes the "Beach Monitoring Plan" submitted by the Service.

Pages 51-52: Describes the water quality protection that results from controls on the type of dredged material to be disposed in the nearshore zone and on adjacent beaches.

Pages 57-58: Describes the "Biological Monitoring and Followup Plan."

Pages 60-61: Change in Pacific Coast Highway bridge design.

EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) has submitted a consistency determination for the restoration of the Bolsa Chica Lowlands, located inland of Pacific Coast Highway on the northern Orange County coastline. The subject consistency determination represents the second phase of a two-phase federal consistency process that began with the submittal in 1996 of a consistency determination by the U.S. Fish and Wildlife Service (Service) for wetland restoration activities at Bolsa Chica. On October 6, 1996, the Commission concurred with CD-115-96 (the Bolsa Chica Lowland Acquisition and Conceptual Wetland Restoration Plan).

That conceptual plan called for the California State Lands Commission (SLC) to purchase 880 acres of wetland habitat, for the Service to restore 385 acres to full tidal wetlands and 220 acres to managed tidal wetlands, and for the retention of 275 acres of the lowlands as an active oil production field (and designated as a future full tidal area). The conceptual plan concurred with by the Commission included construction of an ocean inlet at the southern end of the lowlands for improved tidal circulation, preliminary fish and wildlife habitat restoration objectives, and

elements regarding public access and recreation, oilfield operations, and long term maintenance, operation, and monitoring of the restoration project. Acquisition and wetland restoration was funded primarily from a $78.75 million contribution from the Ports of Los Angeles and Long Beach in exchange for 524 acres of mitigation credits for port landfill construction. The SLC completed the Bolsa Chica acquisition on February 14, 1997, and mitigation credits were released to the ports for landfill projects.

The proposed project includes creation of approximately 366 acres of full tidal and 200 acres of muted tidal wetland habitat, retention of 120 acres of existing seasonal pond habitat, designation of 252 acres as a future full tidal area, construction of an ocean inlet and jetties across Bolsa Chica State Beach, construction of a new Pacific Coast Highway bridge (vehicle traffic and bicycle/pedestrian lanes) over the ocean inlet, a separate oil field access bridge to the east of the PCH bridge, dredging 2.7 million cu.yds. to create a tidal basin in the Lowlands, flood shoal maintenance dredging and disposal for four years, disposal of dredged materials to create a basin berm, nesting islands, and an ebb bar offshore of the ocean inlet, pre-nourishing beaches adjacent to the ocean inlet, construction of a French drain between the restoration project and adjacent housing development, and other construction and mitigation components.

The proposed project is the most environmentally beneficial and, overall, the least environmentally damaging feasible alternative to restore the Bolsa Chica Lowlands to tidal wetland function as envisioned in the 1996 Concept Plan and CD-115-96. The sediment dredging and disposal plan will provide for nearshore and/or upland beach disposal of only those dredged materials from the Bolsa Chica Lowlands that are physically and chemically suitable for unconfined aquatic disposal. The final dredging and disposal plan, including review and approval by the Corps of Engineers and concurrence by the U.S. EPA, will be submitted to the Commission for its review prior to the start of project construction. The proposed restoration project is consistent with the dredge and fill policies of the CCMP.

Many aspects of the restoration project are proposed to minimize or avoid impacts to adjacent beaches, including prefilling an offshore ebb bar and pre-nourishing adjacent beaches with clean sediments dredged from the Bolsa Chica Lowlands. The project's shoreline monitoring plan describes historical data and studies available for the area, and provides definition of monitoring activities and analyses that are expected to assure adverse impacts to area beaches are mitigated. The project is consistent with the shoreline processes and coastal structure policies of the CCMP.

The proposed project will generate significant, adverse effects on public access and recreation, including surfing, at Bolsa Chica State Beach due primarily to the construction of the ocean inlet and the resultant loss of approximately five acres of sandy beach. While the project includes construction and post-construction mitigation measures (a pedestrian and bicycle bridge across the inlet) to minimize the disruption of lateral access along the shoreline due to the inlet, the permanent loss of approximately five acres of sandy beach to the ocean inlet cannot be adequately mitigated. This element of the project is inconsistent with the public access and recreation policies of the CCMP.

However, as noted elsewhere in this report, the construction of an ocean inlet is essential in order to restore full tidal function to the Bolsa Chica Lowlands. The range of wetland habitats proposed for the Lowlands will also serve as mitigation for landfill construction in the Ports of Los Angeles and Long Beach, as provided for in the Interagency Agreement that led to the funding by the Ports of the purchase and restoration of the Lowlands. Without construction of full and muted tidal wetlands in the Bolsa Chica Lowlands via an ocean inlet, the existing significant adverse effects on marine habitat and resources from port landfill construction would go unmitigated. Allowing this situation to occur would be inconsistent with the landfill and marine habitat mitigation policies of Section 30233(a) of the Coastal Act.

The Commission is then left with weighing these two Coastal Act inconsistencies – the absence of mitigation for the loss of five acres of sandy beach to the proposed ocean inlet and the loss of mitigation for 534 acres of marine habitat being filled in outer harbor waters within the ports. The project creates a conflict between the access and recreation policies of Chapter 3 of the Coastal Act on the one hand and the Chapter 3 marine resource policies on the other. Under Section 30007.5 of the Coastal Act (resolving conflicts between competing Coastal Act policies), the proposed project presents a conflict between competing policies of the Coastal Act, in that it promotes restoration of the Bolsa Chica wetlands but also results in the physical loss of public beach due to construction of the ocean inlet component of the restoration project. On an overall basis, on balance it is more protective of coastal resources to resolve this conflict in a manner allowing the loss of sandy beach, due to the significant natural resource benefits that will arise from construction of an ocean inlet across Bolsa Chica State Beach.

The Commission has reviewed the consistency determination, the public comments and letters submitted during the public comment period, the most recent water quality research, and the analysis and response to comments presented in the EIR/EIS related to the potential for the restored wetland to generate adverse water quality impacts on adjacent beaches. The Commission agrees with the conclusions presented in the consistency determination and in associated water quality studies which address the relationship between wetlands and beach water quality, and which conclude that the restoration of the Bolsa Chica wetlands will not result in significant impacts to water quality or beach closures resulting from bird use of the marsh and wetlands area.

The physical and chemical analysis of the dredged materials to be used to create the ebb bar shows that some samples have slightly elevated concentrations of metals and other contaminants. The U.S. Environmental Protection Agency and U.S. Army Corps of Engineers have reported that sediment testing and analysis for the proposed project is not yet complete. However, in order to ensure that the project will not adversely affect water quality, the Service has committed that the final sediment dredging and disposal plan for the project will provide for nearshore and/or upland beach disposal of only those dredged materials from the Bolsa Chica Lowlands that are physically and chemically suitable for unconfined aquatic disposal. The final plan, including review and approval by the Corps of Engineers and concurrence by the U.S. EPA, will be submitted to the Commission for its review prior to the start of project construction. The project is consistent with the water quality policies of the CCMP.

The goal of this restoration project is to restore estuarine and salt marsh habitats within the footprint of the historical area of tidal wetlands. Without question, the overall effect of the project will be beneficial, increasing the health, abundance and diversity of habitats and their constituent species at the Bolsa Chica Lowlands. In addition, a wetland monitoring program to ensure that restoration will be successful was ~~not~~ submitted to the Commission. The purpose of the program is to document the habitat improvements for fish and wildlife, the success of the revegetation efforts, and the use of the site by endangered species. In addition, there are several specific monitoring programs to ensure that the restoration is built according to the approved plans, the inlet is properly maintained, that constructed nesting areas have adequate maintenance, that any impacts to sensitive plant species are offset, and that construction impacts to Belding's savannah sparrow are minimized. The project is consistent with the environmentally sensitive habitat policies of the CCMP.

The proposed ~~64~~-lane PCH bridge over the proposed ocean inlet is necessary to meet the new public works facility obligation triggered by the proposed wetland restoration project. The proposed bridge contains elements to protect public views to and along the shoreline and measures to protect coastal water quality. The proposed four-lane bridge is consistent with the development, visual resource, public access and recreation, and water quality policies of the CCMP.

STAFF SUMMARY AND RECOMMENDATION:

I. Project Description.

A. **Site Location and Description.** The consistency determination describes the wetland restoration project site as follows (**Exhibits 1 and 2**):

> *The Bolsa Chica Project area consists of 1,247 acres of the Bolsa Chica Lowlands in the Bolsa Gap between Bolsa Chica Mesa on the northwest and Huntington Mesa on the southeast, in an unincorporated area of northwestern Orange County. The site is bordered by Warner Avenue on the northwest, residential areas of Huntington Beach on the east, Pacific Coast Highway (PCH) and Bolsa Chica State Beach on the west.*
>
> *A century ago, Bolsa Chica was part of an extensive tidal marsh, including a mosaic of vegetated salt and brackish marsh, with associated tidal embayments, sloughs, mudflats and a direct connection to the ocean. In 1899, Bolsa Chica was diked to prevent tidal exchange in order to manage the resultant ponds as a waterfowl hunting club. Subsequently, the site was further altered by filling, oil extraction activities, flood control facilities, and surface and subsurface hydrologic modifications. Bolsa Chica still contains a significant fraction of the historical marsh system, but its wetland and aquatic functions have been degraded from those that existed historically. The oil well field, in operation since the 1940's, continues to be operated by AERA Energy pursuant to lease and surface use agreements.*

B. **History and Background.** In October 1996, eight state and federal agencies (California

State Lands Commission, California Department of Fish and Game, State Coastal Conservancy, Resources Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, National Marine Fisheries Service, and U.S. Environmental Protection Agency) and the Ports of Los Angeles and Long Beach entered into an Interagency Agreement to establish a project for wetlands acquisition and restoration at the Bolsa Chica Lowlands (**Appendix A**). The Interagency Agreement described a Concept Plan for wetland restoration and addressed: (1) the acquisition of approximately 880 acres of land in the Bolsa Chica Lowlands; (2) the restoration of wetlands, full tidal, and managed tidal habitats in the lowlands; (3) monitoring activities to determine the condition of restored habitats; and (4) the necessary operation, maintenance, and management of project features during and after construction.

The aforementioned eight state and federal agencies (known as the Steering Committee) are overseeing the ongoing development of the proposed restoration plan for the Bolsa Chica wetlands. Planning decisions are reached by consensus and rely on information, analyses, and recommendations of subcommittees made up of representatives from the Steering Committee. The Interagency Agreement delineated the following agency roles and responsibilities for the restoration project:

State Lands Commission (SLC): Acquire and hold title to a minimum of 880 acres at Bolsa Chica; administer and disburse all monies received for the project; serve as lead agency under CEQA in the preparation of the EIR/EIS for the project; acquire, in consultation with the USFWS and Corps of Engineers, the necessary federal and state permits and approvals for the project; operate and maintain, either directly or by agreement with another entity, the completed project.

State Coastal Conservancy: Prepare a detailed Feasibility Plan for the project, based on and consistent with the Concept Plan, and prepare a Final Plan under which the SLC may acquire the above-cited permits and approvals.

U.S. Army Corps of Engineers: Serve as one of the federal lead agencies under NEPA for preparation of the EIR/EIS for the project; administer the permit program under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research and Sanctuary Act.

U.S. Fish and Wildlife Service: Conduct necessary sediment sampling, archaeological surveys, or other technical studies necessary for all permits and approvals for the project; prepare and submit a federal consistency determination to the California Coastal Commission; serve as one of the federal lead agencies under NEPA for preparation of the EIR/EIS for the project; conduct any necessary consultation under Section 7 of the Endangered Species Act; construct the restoration features of the project.

The Concept Plan included the following planning objectives for the Bolsa Chica restoration project:

- Overwintering habitat for migratory shorebirds, seabirds, and waterbirds shall be enhanced.

- Nesting habitat for migratory shorebirds and seabirds shall not be diminished and shall be expanded, where feasible.

- Habitat for estuarine/marine fishes shall be expanded and species diversity shall be increased.

- Nesting and foraging conditions for state and federal endangered species shall not be adversely affected. In addition, implementation of the plan shall contribute to the recovery of the light-footed clapper rail, California least tern, western snowy plover, and Belding's savannah sparrow.

- The mix of habitat types shall include perennial brackish ponds, seasonal ponds/sand flats, pickleweed flats, cordgrass intertidal zone, unvegetated intertidal mudflat, and marine subtidal soft bottom.

- Modifications to the hydraulic regime, necessary to achieve the above objectives, shall include an ocean inlet, full tidal range (i.e., +7.5 to –1.5 feet mean lower low water), low residence time, shall emphasize minimized requirements for manipulation and maintenance, and shall not degrade existing flood protection levels.

- Interests of contiguous property owners shall be protected.

- Once completed, maintenance and management of the area shall maximize native estuarine/ marine fish and wildlife habitat of the Bolsa Chica Lowlands in perpetuity, including active removal of detrimental, non-native biota.

- Allowable public uses shall include passive and nonintrusive recreation activities focused on peripheral areas, interpretive foci, and trails.

- Total removal of oil extraction activities and their past effects shall be conducted in a phased, cost-effective, and environmentally sensitive manner.

- Monitoring and evaluation of the success of biological objectives shall be conducted.

As provided for in the Interagency Agreement, in 1997 the Ports of Los Angeles and Long Beach provided $78.75 million to be used for wetland restoration activities, including the purchase of 880 acres in the Lowlands, in exchange for 534 acres of port landfill mitigation credits. The Final EIR/EIS examines the role of port funding and mitigation credits in the Bolsa Chica wetlands restoration project:

> *The proposed wetlands restoration would offset the loss of habitat resulting from current and future landfill construction in the Ports of Los Angeles and Long Beach. On the basis of habitat values and aquatic functions that would be created as a result of the restoration project, the Ports were granted mitigation credits sufficient to offset 454 acres of landfill in*

the outer harbor areas. Construction of a new ocean inlet large enough to handle tidal volumes both for the full tidal and future full tidal areas (see Section 2.1.6) and eventual reintroduction of tidal influence into the future full tidal area are expected to create habitat values and aquatic functions sufficient to offset an additional 80 acres of landfill in the outer harbor areas of the Ports. These credits have been granted. If the Bolsa Chica Lowlands Restoration Project does not generate sufficient habitat values and aquatic functions to create all 545 acres of landfill mitigation credit or if for some reason the Bolsa Chica Lowlands Restoration Project is not implemented, an alternative tidal restoration project or projects at a location or locations other than the Bolsa Chica Lowlands would be implemented to generate sufficient mitigation credits.

The subject consistency determination represents the second phase of a two-phase federal consistency process that began with the submittal on September 12, 1996, of a consistency determination by the U.S. Fish and Wildlife Service (Service) for wetland restoration activities at Bolsa Chica. On October 6, 1996, the Commission concurred with CD-115-96 (the Bolsa Chica Lowland Acquisition and Conceptual Wetland Restoration Plan)(**Appendix B**). That conceptual plan called for the California State Lands Commission (SLC) to purchase 880 acres of wetland habitat, for the Service to restore 385 acres to full tidal wetlands and 220 acres to managed tidal wetlands, and for the retention of 275 acres of the lowlands as an active oil production field (and designated as a future full tidal area).

Acquisition and wetland restoration was funded primarily from a $66.75 million contribution from the Ports of Los Angeles and Long Beach. On October 6, 1996, the Commission also certified port master plan amendments (POLA 15 and POLB 8) that provided each port with 227 mitigation credits for future landfill construction in their jurisdictions in exchange for their financial contributions to the Bolsa Chica acquisition and restoration program. The SLC completed the Bolsa Chica acquisition on February 14, 1997, and mitigation credits were released for use by the ports in future landfill projects. Later in 1997 the Commission certified port master plan amendments (POLA 17 and POLB 10) and concurred with a Service negative determination (ND-41-97) which provided for an additional 40 acres of mitigation credits to each port after each contributed an additional $6 million to the acquisition and restoration plan, in particular for restoration in the Future Full Tidal Area of the Lowlands.

CD-115-96 included the acquisition of lowland properties at Bolsa Chica and a conceptual wetlands restoration plan, but did not propose a final restoration plan or seek approval of any construction or restoration work. The conceptual plan included adequate details for the Commission to determine that the plan was consistent with the California Coastal Management Program and that it justified provision of landfill mitigation credits to the Ports of Los Angeles and Long Beach. These mitigation credits are currently being used by both ports for landfill construction projects.

The conceptual plan concurred with by the Commission included construction of an ocean inlet at the southern end of the lowlands for improved tidal circulation, preliminary fish and wildlife habitat restoration objectives, and elements regarding public access and recreation, oilfield operations, and long term maintenance, operation, and monitoring of the restoration project.

The Service acknowledged in CD-115-96 that the conceptual restoration plan was the first step in a phased federal consistency review process for the restoration project. Upon selection of a final restoration plan by the Federal-State Bolsa Chica Wetlands Steering Committee, the Service would then be required to submit to the Commission a second, more detailed consistency determination for wetland restoration and construction activities at Bolsa Chica. That second submittal is now before the Commission and is the subject of this staff report. (Currently there is no plan for the submittal of a coastal development permit application to the Commission for the proposed project by any of the State agency members of the Steering Committee, which believe that the proposed restoration project is properly characterized as a Federal government activity.)

Subsequent to the aforementioned Commission actions in 1996 and 1997 on consistency and negative determinations and port master plan amendments, the Commission held a public hearing at its October 14, 1998, meeting in Oceanside to receive a progress report from the Federal-State Bolsa Chica Steering Committee on its development of the restoration plan, the Environmental Impact Report and Statement, ongoing engineering tasks, and oilfield contamination and cleanup issues, and to hear both public and Commissioner comment on those issues. The Commission staff has met on an ongoing basis since 1996 with Steering Committee agency representatives to provide staff input to the process of developing a final restoration plan. The staff submitted formal comments on the Draft EIR/S for the restoration plan in October 2000, focusing primarily on potential project effects on coastal processes and water quality.

The USFWS submitted the subject consistency determination to the Commission for the proposed wetland restoration at Bolsa Chica on June 28, 2001. A public hearing and workshop on the proposal was held at the Commission's August 9, 2001, meeting. The Commission reviewed a preliminary staff report, received comments from the public and government agency representatives, and outlined those subject areas where additional information and/or clarification was necessary to prepare a final staff recommendation for Commission action.

C. **Proposed Project.**

1. Project Elements. The consistency determination describes the proposed wetland restoration project as follows (**Exhibits 3 and 4**):

The Proposed Project – Concept Plan without Flood Control Diversion Structure:

The Proposed Project (attached Figure ES-1 and 2.4B) is the creation of approximately 366.5 acres of habitat that would receive a full tidal range through an ocean inlet near Huntington Mesa. The Proposed Project would not change the existing full tidal part of the Ecological Reserve (Outer Bolsa Bay) or the muted tidal portion of the Ecological Reserve (Inner Bolsa Bay). The edges of Rabbit Island would be tidal. The full tidal area would be created by:

1. *buying out and abandoning the oil wells located on a portion of the acquired property and on the adjacent State Ecological Reserve,*

2. *dredging approximately 2.7 million cubic yards (cy) of material to create a basin,*
3. *constructing a berm around the perimeter of the basin except adjacent to the flood control levee,*
4. *constructing an ocean inlet into the basin, and*
5. *constructing a bridge for PCH over the inlet channel.*

The new ocean inlet would be approximately 360 feet wide between the crest of the jetties, at +13 feet mean sea level (MSL), and would have short jetties extending approximately to the mean low tide line (Alternative A on attached Figure 8-50, and 4-2). The jetties are necessary to prevent the inlet channel from migrating. The ebb shoal will be pre-filled.

Flood shoal maintenance dredging, and disposal of those dredged sediments determined to be suitable for placement on adjacent beaches, for a period of four years (encompassing two anticipated maintenance dredging episodes) commencing at the completion of project construction. At the end of this four-year period, the Service will submit a negative determination or consistency determination to the Commission for subsequent maintenance dredging of the ocean inlet.

A new PCH bridge would be constructed over the inlet channel (attached Figure 10-2). Roadbed approach fills would elevate the roadway to the bridge crest elevation. The existing bikepath west of PCH, along with beach park safety vehicle access would be reconstructed on a portion of the bridge separate from the PCH traffic lanes. A separate, smaller bridge will be provided for the oil field vehicles to access the oil wells next to PCH and north of the inlet channel.

The ocean inlet would be large enough to pass tidal flows sufficient to permit the future restoration of an additional 252 acres to tidal influence. This area is referred to as the future full tidal area. This area would not be restored until oil and gas field operations cease upon depletion of the oil field within 15 to 20 years. Upon depletion of the oil field and removal of the wells and any contamination, it may be feasible to simply breach the dike and allow a large portion of the area to become slough, tidal flats, and salt marsh without extensive earthwork.

Dredge material would be incorporated into levee and road elevation, used to construct nesting islands, or placed on or near the south end of Bolsa Chica State Beach for nearshore disposal or beach nourishment (see below FEIR/EIS Table 2-1, page 2-11). Oil wells, water injection wells, well pads, and access roads would all be removed from within the tidal area. To protect homes inland of the Lowlands from any groundwater impacts resulting from the introduction of tidal flows to the Lowlands, a French drain would be constructed between the wetlands and the housing development.

Approximately 200 acres of the project area would be muted tidal. Muted tidal flow means that the area would experience regular tidal ebb and flow, but would not be exposed to the full range of the tides. The muted tidal area would be connected to the full tidal basin by culverts through the levee.

An area of approximately 120 acres in the southeastern corner of the Bolsa Chica Lowlands would be left unchanged as seasonal ponds. Enhancement of suitable nesting areas for Belding's savannah sparrow would be achieved in the muted tidal areas, while other valuable areas would be retained intact in the seasonal pond area and in Inner Bolsa Bay. Enhancement of suitable nesting habitat for the light-footed clapper rail would be achieved in the cordgrass expansion of the full tidal area. Nesting area for the California least tern and western snowy plover would be achieved through the creation and retention of sparsely vegetated sandflat and saltflat areas protected from disturbance or water inundation.

The 252 acres in the southeast quadrant of the project area (future full tidal) are not proposed to be altered, at this time, and would remain a mosaic of oil well roads and pads and seasonal ponds and flats for many years. Water levels in these seasonal pond/oil field areas will likely require lowering either by pumping or drains in order to protect the ongoing oil field operations in years of high rainfall.

Most of the over 500 poles that formerly supported above-ground power lines would be removed from the Lowlands to reduce the adverse influence of these predatory-bird perching sites near nesting areas. Selected poles would be retained and topped with nest support platforms for great blue heron and osprey. All oil wells and oil infrastructure would be removed from the footprint of the full tidal basin. In the muted tidal, future full tidal and seasonal pond areas of the Proposed Project, oil wells, access roads, and oil pipelines would continue to operate until the lease operator concludes the field is no longer economically viable, perhaps as long as 20-30 years.

. . .

Revetments will be constructed along the seaward toe of slope along the elevated section of PCH [totaling 1,400 feet immediately updrift and downdrift of the ocean inlet]. *This is necessary to prevent damage to PCH that may result from large waves from tropical storms. (Such rare waves have washed over the existing beach and sand berm closing PCH.) The inlet jetties would extend about 445 feet from PCH, extending to the surf zone. Beach sand would be filled to the top of the jetties and covering the highway revetment, largely eliminating the appearance of the rock, except for the seaward ends of the jetties.*

The FEIR/EIS also reports on project elements that:

Although the simulated maximum ebb velocity is below the threshold value of 6 ft/sec for bed scouring, the potential for levee toe scouring adjacent to the inlet entrance still exists. Therefore, the Proposed Project includes two separated armored levee sections totaling 4,800 linear feet to eliminate the scouring impact (Class III).

2. Benefits and Impacts. The consistency determination summarized the expected benefits and impacts to be generated by the proposed project on coastal resources (**Exhibit 5**):

Benefits:

The Proposed Project would restore full tidal wetlands function to 366.5 acres of the Bolsa Chica Lowlands and muted tidal flow to approximately 200 acres. The increased quantity and quality of open water and intertidal mudflat habitats at Bolsa Chica would provide overwintering habitat for migratory shorebirds, seabirds, and waterfowl. A healthy and diverse aquatic community of marine and estuarine invertebrates would become established in the full and muted tidal basins. Restoration of full tidal influence would recreate conditions that would be very beneficial for up to 60 species of fish that no longer exist in this part of Bolsa Chica. The full tidal basin would provide nursery habitat for the California halibut.

Nesting habitat for the state and federal endangered California least tern and the federal threatened western snowy plover would increase and will aid in the recovery of these species. In addition to supporting these endangered species, the nesting areas would provide nesting habitat for a variety of other water-associated birds, including elegant terns, Caspian terns, and Forster's terns. Cordgrass, a low salt marsh plant that generally requires a full tidal range to flourish, would expand at Bolsa Chica. The expanded cordgrass habitat is expected to support nesting by the state and federal endangered light-footed clapper rail. With the Proposed Project, as many as 15 pairs may nest in the Bolsa Chica Lowlands. Pickleweed salt marsh habitat would be enhanced by the introduction of tidal influence. Because the size of a Belding's savannah sparrow nesting territory is smaller in muted tidal and full tidal systems, the Proposed Project would support more pairs of Belding's savannah sparrows (a state endangered species) than existing conditions. About 255 more pairs of Belding savannah sparrows may nest in the project area if the Proposed Project is implemented.

In addition to providing tidal influence to much of the Lowlands, the Proposed Project would preserve several valuable nontidal habitats, including seasonal ponds/sand flats and perennial brackish ponds. These seasonal ponds are overwintering habitat for migrating shorebirds and waterfowl during the winter. In summer, when the flats area exposed, these areas are used for nesting by western snowy plover, and several species of shorebirds. The result would be a diverse wetlands ecosystem. In summary, the Proposed Project would result in a substantial net gain in habitat value compared to existing conditions.

The Proposed Project would indirectly benefit surrounding land uses by providing an improved public passive use and visual enhancement more consistent with the nearby residential, park, beach, and commercial areas than the existing degraded oil development. New and enhanced public access opportunities would result in a beneficial impact to recreation in the project area. The tidal inlet would enhance recreational fishing opportunities. The project also may benefit the local economy by providing construction jobs for the local labor force, and increasing visitors to the area, which would benefit local businesses. The tidal influence would result in reduced mosquito control problems.

Construction Impacts:

Grading of the full tidal basin and construction of berms and the tidal inlet would result in considerable disturbance at the site. Site preparation and erosion control methods would be employed during construction (described in FEIR/EIS Section 2.7.1.3) and would reduce the impacts of this disturbance to an insignificant level.

To counteract the predicted loss of sand to the ebb bar that would form when the tidal inlet is opened, sandy material dredged from the full tidal basin would be pumped into the nearshore zone to pre-fill the ebb bar. Because some of this material may contain as much as 40 percent fine sediment, at times significant turbidity plumes extending as much as several thousand feet downcurrent may occur (Class I impact). Temporary degradation of water quality may occur from other construction activities, such as excavation of the tidal inlet, but these impacts would be localized to within a few hundred feet of the immediate construction area and would be adverse but insignificant (Class III).

Construction of the tidal inlet and pre-fill of the ebb bar would disturb marine organisms in the vicinity of these activities. Recovery of marine communities would occur rapidly after the end of construction, and impacts would be insignificant (Class III). Pre-filling the ebb bar outside the endangered least tern breeding season and peak recreational beach use period would avoid potentially significant adverse impacts to least terns and beach use.

The removal of nontidal pickleweed to construct the full tidal basin could result in the temporary loss of between 118 and 138 Belding's savannah sparrow territories. This loss represents approximately 60 percent of 213 total territories in the Bolsa Chica Lowlands (Class I impact). During construction, nontidal pickleweed outside the full tidal basin would be irrigated if it is a dry year or pumped of excess water if it is a wet year to improve the habitat for Belding's savannah sparrow. This water management during construction would partially offset the territories lost due to grading in the full tidal basin. However, the loss of breeding habitat would remain significant during and immediately after construction. Over the long term, this impact would be mitigated due to the enhanced pickleweed habitat in the muted and full tidal areas. The long-term effect of the project would be beneficial to this species (Class IV).

Construction during the breeding season could potentially disturb or damage nests of the federally threatened western snowy plover. Nest locations would be flagged or fenced. No construction would occur within 100 feet of a nest. Biological monitors would be onsite during the breeding season and all construction personnel would attend an educational program on threatened and endangered species. These measures would ensure that construction impacts to the western snowy plover would be insignificant (Class III).

Although no eligible cultural resources have been found within the project area, there is a slight chance a previously unknown cultural resources could be discovered during construction (Class III). Archaeological monitors would be present during construction and if cultural resources were uncovered proper procedures would be followed to reduce

impacts to insignificant (Class III).

Beach areas about 800 feet north and south of the proposed tidal inlet would be closed to public access during construction of the PCH bridge and tidal inlet. This closure could result in long-term, temporary, significant, adverse (Class II) land use and (Class I) recreation impacts affecting use of the beach during summer holidays and weekends. Other adjacent land uses would not be significantly affected by project construction activities (Class III). During all phases of construction, public safety would be protected by use of barriers, signs, flagmen, and fences where applicable; therefore, no significant, adverse (Class III) impacts would occur.

Inlet construction would result in a temporary loss of surfing use at Lots 14 and 15, and would constrain the already heavily used Lots 23 and 24, resulting in a temporary, significant, adverse (Class I) impact during all four seasons.

Heavy equipment working in the Lowlands would be visible to those with views of the area. Most of the construction activity would occur to the viewer as an element in the middle ground to background of the viewshed and would not be a prominent visual feature, nor substantially change the overall character of the Lowlands. This is considered an adverse but insignificant (Class III) impact for the duration of construction. The most prominent visual activity would be the work at Staging Area 1a for construction of the PCH bridge and tidal inlet. The construction effort would temporarily degrade the character of the site, resulting in a temporary, significant, adverse (Class I) impact. Night lighting for project construction would not result in significant, adverse (Class III) impacts.

Traffic issues from project construction involve potentially significant impacts (Class II) from possible conflicts and safety concerns between construction traffic and local traffic using Seapoint Avenue, and conflicting turning movements at the PCH staging area. An access plan and traffic control plan should be implemented to reduce potential conflicts to insignificant. The Proposed Project would not have a significant, adverse impact (Class III) on roadway segments during construction, and no significant, adverse impacts (Class III) to traffic flow are expected during PCH bridge construction. Project traffic is considered to be an adverse but insignificant (Class III) impact at area intersections.

Construction-related exhaust, dust, and asphalt emissions are anticipated from the Proposed Project. Exhaust emissions would be produced by heavy equipment, truck haul trips, and worker commutes. Nitrogen oxide (NO_X) from exhaust emissions is expected to exceed both the daily and quarterly criteria during construction, resulting in a significant, adverse impact (Class I). Demolition of existing structures and soil disturbance would create dust emissions. Dust emissions from the Proposed Project are considered a significant, adverse (Class II) impact. The application of asphalt during construction could release reactive organic gas (ROG) emissions. ROG emissions would not exceed impact thresholds and impacts would be insignificant (Class III).

The transport of workers, construction equipment, and materials to the site would

incrementally increase noise levels on access roads surrounding the site. An adverse but insignificant (Class III) impact would occur on major routes, while a significant, adverse impact (Class II) would occur on local access roads immediately adjacent to the site.

Noise would be generated onsite during site preparation, grading, and construction. Compliance with County of Orange noise standards and the City of Huntington Beach Noise Control Ordinance would ensure that any onsite construction noise impacts would remain insignificant (Class III). Project construction is specifically scheduled around the breeding and nesting seasons of sensitive animal species to avoid any significant noise impacts (Class III). Phase II construction would also result in insignificant (Class III) noise impacts.

The project would not result in significant, adverse impacts (Class III) to energy consumption. Fossil fuel use associated with construction of the project would result in consumption of less than one-half of 1 percent of the total regional fuel demand, and consumption of electricity would not exceed available resources.

Temporary water and electric utility services would be required at one or more of the construction staging areas. Utilities are currently available onsite and the use of those utilities would be an insignificant (Class III) impact. The project would have insignificant impacts (Class III) on other public services, such as solid waste disposal, fire protection, police protection, and vector control.

Operational Impacts:

Pre-fill of the ebb bar with material dredged from the full tidal basin, combined with a beach monitoring and maintenance program, would prevent significant beach erosion during Phase I (Class III). However, when the future full tidal basin is opened during Phase II, the increased tidal prism would cause more sand to be lost to the ebb bar. To prevent the loss of beach sand, about 410,400 cy of material would be dredged from an offshore borrow site and discharged at the ebb bar. Discharge of sediment at the ebb bar could have a temporary significant adverse impact on water quality (Class I).

Introduction of tidal flows to the Lowlands could cause groundwater levels in the residential area adjacent to the Lowlands to rise and the groundwater to become more saline (Class II). The proposed dewatering trench (French drain) would be installed to reduce impacts to groundwater to insignificant. However, additional analysis is needed to determine the exact design needed to effectively manage groundwater levels.

The construction of a tidal inlet would make the Bolsa Chica wetlands vulnerable to an offshore oil spill (Class I).

Tidal inundation around the edges of Rabbit Island could result in a loss of coastal woolly-heads. Although this plant is not on federal or state lists of protected species, the Rabbit Island population of coastal woolly-heads is sensitive because it is 1 of only 10

populations known to occur in the mainland United States (Class II). Several sensitive insect species and the silvery legless lizard would also be affected by loss of part of Rabbit Island. Because the insects and lizard are most closely associated with the dune habitat in the center of Rabbit Island, which would be least affected by tidal flows, and because all of these sensitive species are present in dunes along Bolsa Bay, these impacts would be adverse but insignificant (Class III). Except for possible impacts to the coastal woolly-head, loss of part of the Rabbit Island's environmentally sensitive habitat area (ESHA) to tidal wetlands, a more valuable habitat, is considered insignificant (Class III).

The part of the eucalyptus grove ESHA within the Bolsa Pocket could be damaged by the introduction of muted tidal flows. The eucalyptus trees provide valuable habitat for a variety of raptors. The loss of a small portion of the eucalyptus grove is considered an adverse but insignificant impact because eucalyptus trees on Bolsa Mesa would be preserved (Class III). Very few living trees are found in the Pocket but saltier groundwater could potentially harm the handful of trees growing on the edge of adjacent higher ground.

The Proposed Project would include regular beach nourishment at approximately 2-year intervals. Placement of sand in the surf zone during maintenance dredging may interfere with the spawning of California grunion (Class II). Spawning occurs during nighttime high tides between March and August.

Construction of the proposed tidal inlet would result in the permanent loss of beach as a result of land to water conversion. This impact would be adverse but insignificant (Class III). The continuity of the beach would be broken and would affect beach users traversing the length of the beach. Access across the inlet would be provided on the PCH bridge via a pedestrian access crossing, reducing the impact of breaking beach continuity to adverse but insignificant (Class III). The surfing experience would change as a result of construction of the tidal inlet. This difference would be perceived in different ways and would result in adverse but insignificant (Class III) impacts because some surfers would view the change as beneficial and some would not.

The project is compatible, from a land use perspective, with adjacent existing and future planned uses. No significant, adverse (Class III) policy impacts would occur. A potentially significant (Class II) safety issue may result if persons stray too close to the jetties. Situations that may result in injury include persons being washed off of or falling from the jetties, or getting swept into the inlet. Warning signs and lifeguard stations would be provided near the tidal inlet to reduce impacts to insignificant.

The new PCH bridge over the tidal inlet would change the character of the beach area when it is converted to this new use. Visually, there should not be a negative impression. Therefore, the new bridge would cause no significant, adverse visual impacts (Class III).

Post-construction traffic activity would be similar to that of year 2002 traffic without cumulative traffic or project traffic added. Operations would include infrequent maintenance, and traffic impacts would be adverse but insignificant (Class III). In the year

2002 cumulative project scenario, four intersections would operate at level of service (LOS) E. This cumulative condition would result in a significant, adverse (Class II) impact. The project contributes incrementally, but insignificantly, to the cumulative impact.

Following construction, minor air emissions may result from French drain operations and maintenance dredging. Operation of the French drain would consume electricity and would contribute a small amount of emissions associated with the production of electricity. Emissions associated with the generation of electricity are considered insignificant (Class III). Maintenance dredging may be required to keep the tidal inlet clear and would result in significant, adverse impacts to air quality (Class II).

Post-construction monitoring and maintenance would not result in a significant number of additional vehicle trips to the site and would not change vehicle-generated noise levels in the project area, an insignificant (Class III) impact. Operation of the French drain may require the use of pumps; however, the pumps would not be audible at any offsite locations. Therefore, insignificant, adverse (Class III) noise impacts would result. Maintenance dredging would not cause any significant, adverse noise impacts (Class III) if restricted to the hours of 7:00 a.m. to 10:00 p.m.

3. Long-Term Management. The consistency determination examines the proposed long-term management of the restored wetland complex:

Title to any properties acquired in the Bolsa Chica Lowlands for the Project will be held by the SLC. Pursuant to Section 1(d) of the Interagency Agreement, the SLC shall hold all lands so acquired "... in public trust ... for the purposes of ecological restoration and preservation, scientific study, open space, and fish and wildlife habitat protection."

Section 7(a) of the Interagency Agreement then makes the SLC responsible for effecting the Restoration O & M and Management Components of the Project (i.e., for carrying out the long-term operation and management of the Project). The Agreement acknowledges, however, that the SLC may enter into an agreement with another agency or entity for this purpose. In this regard, the CDFG and the Service have a "first right of refusal" to enter into an agreement to manage the Lowlands on the SLC's behalf. If the Service should ultimately enter into such an agreement, then the lands acquired for the Project will be managed by the Service as a unit of the National Wildlife Refuge System (see Section 7(c) of the Agreement). If the CDFG should ultimately enter into such an agreement, the new lands would be added to the existing Ecological Reserve which they manage.

4. Schedule and Budget. The consistency determination includes discussion regarding the construction schedule:

Construction would occur in four phases (see FEIR/EIS Figures 2-19A and B) and would avoid or minimize impacts to fish and wildlife resources. The FEIR/EIS Environmental Constraint figure 2-20 is attached. Phase 1 (September-March) includes

clearing and grubbing the full tidal basin, west half bridge and PCH detour construction, inlet construction begins. Phase 2A (March to September) includes completion of PCH bridge, levees and revetments of the full tidal basin, the French drain, cordgrass shelf, and preparations to begin dredging in the full tidal basin. Phase 2B includes dredging the full tidal basin, pre-filling the ebb shoal, constructing inlet jetties, PCH revetments, and nesting areas. Phase 3 includes muted tidal area culverts, salvage revegetation, and removal of some staging areas. Phase 4 includes completion of dredging, if necessary, opening of the inlet, and demobilization of construction equipment. See Chapter 2 of the FEIR/EIS for a more complete description.

The consistency determination states that construction of the proposed project would take approximately three years.

The current estimates of the incurred costs, future costs, and currently available funds for the proposed project are outlined in the consistency determination as follows:

EXPENDED	
Purchase of KREG property	*$25,000,000*
EIR/EIS & prelim. engineering	*2,400,000*
Contaminants Sampling and EcoRisk Assessment	*6,000,000*
SET ASIDE FOR FUTURE USE	
Future Full Tidal Restoration Account	*1,800,000*
Maintenance Account (long-term O&M)	*6,200,000*
FUNDS CURRENTLY AVAILABLE	
Wetlands Restoration Account	*53,000,000*
(Other funds only for Fieldstone Acquisition	*1,200,000)*
ACTIONS YET TO BE TAKEN	
Oil buyout and well removal in tidal basin	*8,000,000*
Final design and project management	*9,400,000*
Proposed Project Construction Cost (Dec. 99 est.)	*53,700,000*

Based on these estimates the potential "shortfall" may be as much as $18,000,000. The construction cost estimate will be updated, but the actual cost of construction will be better known after final design is completed and once the actual construction bids are opened. The construction cost estimate also includes a 20% contingency cost. Also, obtaining commitments for additional funds, at this time, is made more difficult by the fact that there is no actual shortfall of funds at this time.

The consistency determination also states that:

Funding for the long-term operation and maintenance of the Project is assured through the creation of a $5 million Maintenance Account, which will be held by the SLC (See Section 13(c) of the Interagency Agreement). The investment earnings from this principal account will be available only for annual expenses, with the first "expense" being a requirement to reinvest a sufficient amount to offset the effects of inflation.

D. **Status of Oilfield Cleanup and Ecological Risk Assessment.** The consistency determination addresses oilfield contamination and cleanup and the Ecological Risk Assessment for the Bolsa Chica Lowlands:

Five decades of oilfield operations in the lowland have contributed some degree of contamination in the sediments of the wetlands and the network of oil well pads, sumps, and roads. When the 880-acre property was acquired by the State in 1997, a voluntary cleanup agreement was executed with the Responsible Parties (oil companies and the seller). In this agreement, the Project assumed responsibility to characterize the nature and extent of contamination, identify contaminant threats to natural resources, determine the appropriate cleanup criteria for the site, and determine areas to be cleaned up. The Fish and Wildlife Service has the lead role in the Risk Assessment phase which includes completing the biotic, water and sediment sampling and preparing an Ecological Risk Assessment (ERA). The ERA will integrate the sampling results with the known wildlife use of the site and estimate the type and amount of contaminant exposure risk to fish and wildlife. This information will be used to develop clean-up criteria which, once implemented, will result in an acceptable or minimal contaminant exposure to wildlife subsequently using the site. The Responsible Parties will then prepare and execute a cleanup plan at their expense. Verification sampling is to be conducted after cleanup to verify that the desired levels of cleanup have been attained. The Regional Water Quality Control Board has approval and oversight of the cleanup plan, with funding support from an EPA grant. EPA is to supplement the ERA with its evaluation of whether risks to human health warrant additional response actions.

The sampling to characterize the nature and extent of contamination is almost complete and results are presented in a draft ERA document that will be completed and made public after review by the responsible parties. The discussions with the oil company and former owner of the property are under way to determine the cleanup levels and cleanup plan.

Until the cleanup levels and plan are adopted, specific or quantified cleanup actions cannot be defined. However, closure of wells and cleanup in the vicinity of wells is not expected to be in dispute and has been conducted by the Lease Holder, AERA Energy, on their own schedule for the last several years pursuant to their lease agreement with the Landowner. Contaminants warranting cleanup beyond the vicinity of active and idle wellheads are the principal focus of the ERA and cleanup plan. Some generalized cleanup methods can be described: safely sequestered contaminants may be left in place, stable contaminants may be sequestered in constructed fills within the restoration project (e.g. berms), contaminated sediments may be hauled to appropriate landfill sites, or "landfarming" treatment techniques may be used within the lowland. The volumes of dirt requiring treatment or disposal handling different from that shown for the restoration project alternatives are unknown at this time. If the cleanup plan proposed by the responsible parties entails substantial changes to the habitat restoration project and its associated impact evaluation, a supplemental environmental analysis may be necessary.

The oilfield cleanup work addressed by the ERA will require the leaseholder to obtain a U.S. Army Corps of Engineers Section 404 (Clean Water Act) permit and may require a coastal development permit from the Commission. In addition, the Service states in the Final EIR/EIS and in the consistency determination that no restoration work or exposure of land to tidal action will occur until the oilfield cleanup activity is complete and verified.

II. Status of Local Coastal Program.

The standard of review for federal consistency determinations is the policies of Chapter 3 of the Coastal Act, and not the Local Coastal Program (LCP) of the affected area. If the LCP has been certified by the Commission and incorporated into the CCMP, it can provide guidance in applying Chapter 3 policies in light of local circumstances. If the LCP has not been incorporated into the CCMP, it cannot be used to guide the Commission's decision, but it can be used as background information. The Bolsa Chica LCP has **not** been certified by the Commission nor incorporated into the CCMP.

Port funds must be used for public trust purposes. Thus, because the ports funded the acquisition of the lowland property by the State Lands Commission, those lands were impressed with the public trust at the time they were acquired by the State, and no amendment to the LCP is required. Under Public Resources Code Section 30519(b), the Commission (rather than the County of Orange) has the authority to issue coastal development permits for development undertaken on public trust lands. In the event the Commission receives such an application, the standard of review will be Chapter 3 of the Coastal Act and not the certified Bolsa Chica LCP. The balance of the land in the area within the Bolsa Chica LCP that is not acquired by the State using port funds will remain subject to the County's jurisdiction if there is a certified LCP, or the Commission's jurisdiction in the absence of a certified LCP.

III. Federal Agency's Consistency Determination.

The U.S. Fish and Wildlife Service has determined the project consistent to the maximum extent practicable with the California Coastal Management Program.

IV. Motion:

I move that the Commission adopt the following findings in support of its concurrence in the U.S. Fish and Wildlife Service's consistency determination CD-061-01.

V. Staff Recommendation.

The staff recommends a **YES** vote on this motion. Pursuant to Section 30315.1 of the Coastal Act, adoption of findings requires a majority vote of the members of the prevailing side present at the November 13, 2001, hearing, with at least three of the prevailing members voting. Only those Commissioners on the prevailing side of the Commission's action on the consistency

determination are eligible to vote. A majority vote by the prevailing Commissioners listed on page 1 of this report will result in adoption of the findings.

VI. RESOLUTION TO CONCUR WITH CONSISTENCY DETERMINATION:

*The Commission hereby **concurs** with the consistency determination by the U.S. Fish and Wildlife Service on the grounds that the project described therein is consistent with the enforceable policies of the CCMP.*

VII. Findings and Declarations.

The Commission finds and declares as follows:

A. DREDGING AND FILLING. The Coastal Act provides:

Section 30233

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

. . .

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division. . . .

As described in above Section I-C-1 of this report, the proposed wetland restoration involves dredging approximately 2.7 million cu.yds. of material from the Lowlands to create a tidal basin and ocean inlet, placing a portion of the dredged material in the Lowlands to create a berm around the basin and to construct nesting islands, disposing dredged materials in ocean waters to pre-fill the offshore ebb bar and to pre-nourish the beach downcoast of the ocean inlet, four years of ocean inlet maintenance dredging and disposal, and dredging sandy materials from an offshore

borrow site to expand the ebb shoal during Phase 2 of the project (Future Full Tidal Area). These activities need to be examined for consistency with Section 30233 of the Coastal Act. Under this section, dredging and disposal within wetlands, estuaries, and open coastal waters is limited to those cases where the proposed project is an allowable use, is the least damaging alternative, and where mitigation measures have been provided to minimize environmental impacts.

The allowable use test is met because the aforementioned dredging and disposal activities would be performed for habitat restoration purposes, an allowable use under Section 30233(a)(7).

The second test requires the Commission to examine whether the proposed project is the least environmentally damaging feasible alternative. The Service provided detailed analysis in the Final EIR/EIS of numerous wetland restoration alternatives to the proposed project (the Concept Plan without the flood control channel diversion structure). Those alternatives are referenced in the consistency determination and are summarized below:

1st Sub-Alternative: Restoration of Future Full Tidal Basin Concurrently with Phase I Restoration. This alternative is identical to the proposed project but would in addition restore the Phase II future full tidal basin in the northeast corner of the Bolsa Lowlands concurrently with restoration of the rest of the Lowlands rather than in 15 or 20 years when oil operations are completed.

2nd Sub-Alternative: Concurrent Restoration of Expanded Future Full Tidal Basin. This alternative is identical to the 1st Sub-Alternative but the future full tidal basin area would be dredged to increase the area of intertidal habitat.

Alternative 1: Flood Control Channel Routed into the Concept Plan Full Tidal Basin. This alternative would be the same as the Concept Plan but with all flows from the EGGW Flood Control Channel routed into the full tidal basin (**Exhibit 6**).

Alternative 2: Full Tidal Basin with a New Ocean Inlet near Rabbit Island. This alternative would create a full tidal basin and managed tidal areas similar to the Concept Plan but with a new ocean inlet near Rabbit Island where the EGGW Flood Control Channel discharges into Outer Bolsa Bay (**Exhibit 7**).

Alternative 3: Full Tidal Basin with an Ocean Inlet near Warner Avenue. This alternative would introduce tidal flows to the Concept Plan alternative through a new ocean inlet near Warner Avenue (**Exhibit 8**).

Alternative 4: Three Jetty Plan. With this alternative, a tidal inlet to the wetlands would be constructed near Rabbit Island and a separate inlet for discharge of flows would be constructed from the EGGW Flood Control Channel parallel to the inlet to the wetlands (**Exhibit 9**).

Alternative 5: Irrigation/Water Management. Minor modifications would be done to existing conditions to permit brackish water ponds to persist year-round. Water would be pumped between cells to prevent water levels from becoming too high or too low (**Exhibit 10**).

Alternative 6: The Concept Plan. This plan is identical to the proposed project, except that a side weir would be installed into the levee of the EGGW Flood Control Channel to allow spillover of a portion of the 100-year peak flood discharge into the full tidal basin. Storm flows would be conveyed to outer Bolsa Bay and the restored wetlands via the EGGW Channel; flows from the channel would begin to spill into the full tidal basin during a 10-year storm (**Exhibit 11**).

No Action Alternative. Nothing would be done to alter the water regime within the Lowlands.

The Final EIR/EIS also examined three alternatives which received additional analysis to determine their technical and economic feasibility prior to elimination from further detailed analysis:

Full Tidal Basin with Culverts and No New Inlet. This alternative would seek to restore a habitat mix similar to the Concept Plan by the construction of a series of large culverts running beneath PCH and the beach to connect the wetland to the ocean at the southern portion of the project area.

Small Area of Full Tidal with Huntington Harbour Connection and No New Inlet. This alternative would create full tidal expansion in the Pocket and Old Slough, widen the Warner Avenue opening to increase water supply through Huntington Harbour, dredge Outer Bolsa Bay, and discharge the EGGW Flood Control Channel directly into the Pocket full tidal basin.

Concept Plan with Discharge of Low Flows into the Wetlands. This alternative would split the flow from the EGGW Flood Control Channel to allow low flows to discharge to the wetlands and storm flows to bypass the wetlands and discharge into Outer Bolsa Bay.

Finally, the Final EIR/EIS reported on two project alternatives which were examined but eliminated from further detailed analysis:

Full Tidal Basin with Meandering Inlet. This alternative would include a habitat mix similar to the Concept Plan but tidal influence would occur through creation of a 1,000-foot-long causeway supporting PCH with no jetty structures for stabilization. This wide opening would allow the tidal channel connecting the tidal basin to the ocean to meander within the 1,000-foot opening to the ocean.

Orange County Coequal Plan. With this alternative, a new tidal basin would be constructed in the central Lowlands and would introduce tidal flow through construction of a new ocean

inlet near Huntington Mesa. All flood control channel waters would be diverted into the new tidal basin. Additional habitats would include muted tidal and seasonal ponds. The area near the northeast boundary would be managed by freshwater irrigation.

The Service addresses in its consistency determination the project alternatives and its selection of the proposed project:

The selection of the Proposed Project was based on two considerations. The first consideration was the lesser extent of significant, adverse impacts that would result from project implementation. The second consideration was the extent to which wetland function and values within the Bolsa Lowlands would be improved, i.e., the ability of the selected alternative to meet the project purpose and need.

Of the project alternatives analyzed in detail, Alternative 5 had the fewest adverse impacts because it would involve minimal construction. Also, because no tidal inlet would be constructed for Alternative 5, it would avoid the significant, adverse impacts to water quality, recreation, and land use from construction of the tidal inlet and pre-fill of the ebb bar at Bolsa Chica State Beach. However, Alternative 5 provided by far the lowest habitat benefits of the restoration alternatives. Alternative 5 would provide no benefits to marine fishes such as California halibut and may even be detrimental to marine fishes that would enter the Lowlands during the limited periods of tidal action. Alternative 5 would enhance the pickleweed vegetation in the Lowlands by providing periodic tidal flow but probably would not increase the diversity of wetlands vegetation. Specifically, no cordgrass would become established in the Lowlands if Alternative 5 were selected. Because no cordgrass would become established in the Lowlands with Alternative 5, no habitat would be provided for the endangered light-footed clapper rail. Alternative 5 would provide only a slight enhancement of overwintering habitat for migratory shorebirds, seabirds, and waterfowl. Foraging opportunities for the endangered California least tern and other tern and gull species would be only marginally increased. Furthermore, Alternative 5 would be expected to create more problems for Vector Control than the existing condition (Class III). In contrast, the tidal inlet alternatives would be less conducive to mosquitoes than the existing condition.

All of the tidal inlet alternatives would provide similar habitat benefits including:

1. *increased quality and quantity of open water and intertidal mudflat habitats for migratory shorebirds, seabirds, and waterfowl;*
2. *a healthy and diverse aquatic community of marine and estuarine invertebrates and fishes including nursery habitat for the California halibut;*
3. *increased nesting habitat and foraging opportunities for the state- and federal-listed endangered California least tern and the federal-listed threatened western snowy plover, as well as a variety of other water-associated birds;*
4. *expansion of cordgrass habitat to support nesting by the state and federal-listed endangered light-footed clapper rail; and*

5. *enhancement of pickleweed saltmarsh habitat that would expand nesting territories of the state-listed endangered Belding's savannah sparrow.*

Of all the restoration alternatives, the Proposed Project would provide the highest quality environment for aquatic fish and invertebrates because the EGGW Flood Control Channel would not discharge into the full tidal basin. Therefore, the disturbance to the aquatic community from the freshwater influx and pollutants during storm flows would not occur.

Because the Proposed Project would have no discharges from the EGGW Flood Control Channel, metals and bacteria would not be carried into the wetlands and the ocean. All of the other tidal inlet alternatives would have a significant, unmitigable, adverse impact to water quality in the wetlands and coastal waters from pollutants in storm flows (Class I). Bacteria in ocean waters would exceed thresholds and swimming and surfing would be restricted. Loss of swimming and surfing use of ocean waters during periods when bacteria exceeded threshold levels would be an unmitigable, significant, adverse impact to recreation (Class I).

The Proposed Project also would not result in the permanent loss of beach parking spaces that would occur with Alternatives 2, 3, and 4. The loss of parking spaces is a significant but mitigable impact (Class II). The Proposed Project would have a significant, unmitigable impact to surfing during project construction (Class I) that would not occur for Alternatives 2 and 4. However, construction impacts to surfing would be temporary. The Proposed Project was selected as preferred because it would provide much greater habitat benefits than Alternative 5, and would avoid the unmitigable, significant, adverse impacts to water quality and recreation that would occur with the other tidal inlet alternatives. The greatest habitat benefits would occur if the Proposed Project were combined with the 2nd Sub-alternative. Habitat benefits would also be increased, but to a somewhat lesser extent, if the Proposed Project were combined with the 1st Sub-alternative. No additional significant, adverse impacts would occur with either of these sub-alternatives, although the potentially significant (Class II) impacts of excavation of an offshore borrow pit would occur at the same time as the Phase I construction impacts rather than 15 or 20 years in the future.

The proposed project is the most environmentally beneficial and, overall, the least environmentally damaging feasible alternative to restore the Bolsa Chica Lowlands to tidal wetland function as envisioned in the 1996 Concept Plan and CD-115-96. The other alternatives, while technically feasible, would lead to significant adverse effects on coastal resources, particularly water quality and recreation, and/or would not provide the volume of seawater inundation necessary to restore the range and diversity of tidal wetland habitats and functional values across the Lowlands outlined in the 1996 Interagency Agreement.

As discussed further in the sections below, the proposed project does hold the potential to generate significant adverse impacts on coastal resources at and adjacent to the project site, in particular on water quality and public access and recreation. However, the design elements and

mitigation measures built into the project will minimize most of the potential adverse effects on coastal resources. In addition, the Service submitted the following language to the Commission on November 9, 2001, that modified the dredge and fill element of the proposed project as follows:

> *We continue to work with the Corps of Engineers, Environmental Protection Agency, and Coastal Commission staff to identify the specific dredge material volumes for use in constructing the ebb shoal. We believe we have demonstrated that it is feasible to determine those areas proposed for dredging, that are both sandy enough and clean enough for placement in the ocean nearshore zone and are seeking concurrence of these regulatory agencies. If, by the time of the [November 13, 2001] public hearing on the project, the regulatory agencies have not provided this concurrence, we will modify the proposed Bolsa Chica wetlands restoration project by stating that:*
>
> 1. *Prior to the start of construction, the Service will submit to the Commission for its review the final sediment dredging and disposal plan for the project (including evidence of plan review and approval by the U.S. Army Corps of Engineers and concurrence by the U.S. EPA);*
>
> 2. *The final sediment dredging and disposal plan will provide for nearshore (i.e., to create the offshore ebb bar and to nourish adjacent beaches) and/or upland beach disposal of only those dredged materials from the Bolsa Chica Lowlands that are physically and chemically suitable for unconfined aquatic disposal;*
>
> 3. *As used above, the term "physically suitable" means the greater of either: a) 80% sand by total volume; or b) in the case of upland beach disposal, within 10% of the existing proportion of sand in the material on the receiving beach; and*
>
> 4. *As used above, the term "chemically suitable" means that the results of chemical analysis demonstrates that: a) the dredged materials are not hazardous waste (as defined by California Health and Safety Code Sections 25117 and 25141); and b) meet the requirements of the "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Inland Testing Manual" (U.S. EPA and Corps of Engineers (February, 1998)), which addresses sediment disposal requirements contained in the federal Clean Water Act Section 404(b)(1) guidelines (40 CFR Part 230).*

With this modification to ensure that the proposed dredge and fill elements of the project represent the least environmentally damaging alternative, and that these activities are implemented in a manner that minimizes adverse effects of coastal resources at the dredged material disposal sites, the Commission finds that the proposed project is consistent with the dredge and fill policies of the CCMP.

B. SHORELINE STRUCTURES/COASTAL PROCESSES. The Coastal Act provides:

Section 30235

Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.

Section 30233(b)

Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable long shore current systems.

1. Existing Environment. Bolsa Chica State Beach is a relatively wide sandy beach starting at the Anaheim jetties to the north, and ending at the Huntington Cliffs to the south. South of Huntington Cliffs is Huntington Beach City Beach. Much of the Bolsa Chica State Beach is 200-foot-wide or wider, with the beach width decreasing at the southern end, in the area of Huntington Cliffs. Beach width varies seasonally and fluctuations of the Mean Lower Low Water line can range from 50 to 150 feet within the Bolsa Chica area. The following table shows the average beach widths and seasonal variations for the alternative tidal inlet locations:

Typical Beach Widths and Seasonal Variability, Bolsa Chica State Beach

Location	Average Beach Width	Average Seasonal Beach Width Variability, At MSL Line
Warner Avenue	413	63
Rabbit Island	311	29
Concept Plan (proposed)	243	22

Historically the Santa Ana River provided sand for this beach area. The Anaheim Jetties were constructed in the 1940s and blocked the delivery of sediment from the Santa Ana River to this area. Since the construction of these jetties, the main source of new sand to these beaches has been from regular nourishment of the beaches at Surfside and Sunset beaches. Since 1945, over 16 million cubic yards have been placed on Surfside or Sunset beaches (DEIR, Table 3.2-6). As noted in the FEIR, this nourishment project "is an authorized project with an indefinite life and will remain authorized unless specifically acted upon by Congress. However, future beach nourishment stages will be dependent on funding contained in future federal energy and water appropriations and from the State of California and local governments. If the Surfside/Sunset

Beach nourishment program is terminated, sediment deficiency will be likely to occur for the entire coastal segment from Surfside/Sunset to West Newport Beach." (DEIR, Page 3-62)

Sediment transport along the beach at Bolsa Chica has a strong seasonal pattern. During the winter months, November to March, storms and swell from the west and northwest move sediment to the southeast. This trend is reversed in the summer months, May to October, when the swell comes from the south. The summer swell is typically milder than winter storms, resulting in net sediment transport to the southeast. The gross annual transport rate is about 300,000 cubic yards, and the net annual transport (to the southeast) is about 80,000 cubic yards.

The wave climate and offshore bathymetry at Bolsa Chica State Beach provides many opportunities for surfing, mostly from beach surf breaks. One spot, to the south of the project site, close to Huntington Cliffs has bathymetry that provides consistent wave focusing that provides more desirable surfing conditions. Along the rest of Bolsa Chica State Beach, the nearshore bottom is sandy and the preferred surf spots tend to vary up and down the shore, based on bottom conditions and the combination of wave direction and period. A surfer survey showed that the most crowded areas for surfing were near to Lots 14 and 15 (near the proposed tidal inlet) and Lots 23 and 24 (between Warner Blvd. and Rabbit Island). The DEIR noted, however, "no evidence of a specific nearshore bathymetric feature that produces a unique wave at any particular location," which is typical of beach break surfing areas.

2. Proposed Project. The proposed project will include construction of a tidal inlet across the sandy beach to develop tidal exchange between the ocean and the proposed full tidal wetlands (**Exhibits 12-14**). The main elements for this inlet will be:

- 420-foot-long, four-lane bridge (with two bike lanes) along Pacific Coast Highway;
- one 445-foot-long rip-rap rock jetty, with crest elevation of +13 MSL, extending to mean low tide;
- one 420-foot-long rip-rap rock jetty, with crest elevation of +13 MSL, extending to mean low tide;
- 1,400-foot-long (approximately) rip-rap rock revetment paralleling the highway;
- excavation of approximately five acres of beach to open the jetty inlet (190,000 cubic yards);
- non-navigable tidal inlet, approximately 360 feet wide (between crests of the jetties);
- pre-filled ebb tidal bar, created with approximately 1,331,000 cubic yards of sediment;
- advance downcoast nourishment with approximately 190,000 cubic yards of beach sand;
- seven monitoring sites to measure complete profiles (to –40 feet MLLW) twice a year;
- monthly beach-width surveys;
- regular dredging of the flood bar to maintain full tidal exchange; and
- regular nourishment of downcoast beaches, using sand dredged from the flood bar.

3. Phase 1 and Phase 2 Restoration. The restoration project will occur in two phases and the tidal inlet has been designed to handle the tidal exchange that will be needed for the full-tidal condition of Phase 1 and Phase 2. The most significant changes that will occur between Phase 1

and Phase 2 will be the increased tidal exchange, increased flows through the inlet, and the increased size of the ebb and flood tidal bars. The jetties and tidal inlet will be designed and built for the Phase 2 flow conditions. The ebb bar will be pre-filled to conform to the size and extent of the ebb bar that would be expected to develop for the Phase 1 tidal exchange conditions of each phase. The ebb bar will be constructed for Phase 1 conditions and later will be expanded for Phase 2. When the Phase 2 restoration is completed, the existing ebb bar will be artificially enlarged with additional nourishment material to match the new tidal exchange conditions.

4. Project Alternatives. Alternatives to the full tidal option are discussed above in Section A of this report. Options that would provide full tidal exchange are:

- the proposed inlet at the south end of the Bolsa Chica Ecological Area
- a new tidal inlet adjacent to Rabbit Island
- a new tidal inlet adjacent to Warner Avenue
- culverts connecting the ocean and the full tidal area

The historic inlet for this area (circa 1873) was Los Patos channel, near the northwest corner of Bolsa Chica Mesa, and closer to the proposed Warner Avenue inlet area. Many of the coastal impacts from a new tidal inlet will occur regardless of the location of the inlet. Shifting the inlet location will just shift the location of the impacts. Downcoast erosion is a possible adverse impact from any of the new inlets and ebb shoals. The Rabbit Island and Warner Avenue inlet locations would be further from the Huntington Cliffs than the proposed inlet location. Either of these inlet locations could reduce the potential for adverse impacts at Huntington Cliffs. However, due to the seasonal reversals in sediment transport, these inlet locations also could exacerbate erosion concerns at the Surfside/Sunset beaches.

The inlet designs will change slightly for the various inlet locations. The Warner Avenue location would not require any shoreline protection, due to the current width of the beach. But, since the beaches at Warner Avenue and Rabbit Island are wider than at the proposed inlet location, and since these beaches have greater seasonal variability, these sites would require longer jetties to maintain full tidal exchange. There will be small differences in impacts to coastal processes between the different inlet locations; in general, all three inlet locations pose the potential for comparable impacts from a coastal process perspective.

The option that would minimize impacts to coastal processes would be the use of culverts that would go beneath Pacific Coast Highway and the Bolsa Chica State Beach. The culvert option would entail use of a dozen 20-foot diameter culverts. The ocean end of culverts would have to extend beyond the zone of active sand transport to avoid being sanded in, so each culvert would have to be about 8,000' long. It is questionable whether fish would use these culverts to travel into and out of the restored wetland. In addition, due to the size and length of the culverts, this option would cost between $150 and $200 million and could not be covered by the existing restoration budget.

5. Impacts from the Proposed Project and Efforts to Eliminate or Minimize Impacts.

(a) Loss of Beach. During construction of the Pacific Coast Highway Bridge, the jetties and the tidal inlet, public access to the work area will be restricted for public safety reasons. The restricted access region would be approximately 1,000 feet from the center of the inlet, in both directions, spanning 2,000 feet total. The average beach width in this location is about 243 feet, so the total area of temporarily lost beach access is about 486,000 square feet, or 11.2 acres. This temporary loss of beach access would last for about three years. Beaches up and down coast of the construction area would remain open for public access, although construction activities could reduce available parking and access to the beach from the Bolsa Chica State Park facilities. The only access for the public beaches south of the construction area will be to either walk 2,000 feet along the temporary bike path, or walk north from the City beach. No new temporary access will be provided to the beach south of the construction site.

After the construction phase is completed, access will be allowed again to the remaining beach areas. The revetments, the jetties and the tidal inlet will be permanent structures and will continue to occupy land that previously had been public beach. The jetties and tidal inlet are needed to maintain a stable tidal inlet, and they will permanently replace about five acres of beach.

The precise area of revetment encroachment has not been calculated since the revetment designs have not been finalized. The proposed revetments, north and south of the tidal inlet, would total 1,400 feet. They would be immediately adjacent to the elevated roadbed of PCH and would be mostly covered by sand. The revetments are being proposed as a last line of defense to provide the minimum necessary protection for PCH and the State Parks parking lots from extreme beach retreat during a severe storm. Due to their location at the backshore, they should only interfere with coastal processes during extreme storm events. The Service did not consider any alternatives to the revetment, stating that this design is "the most effective at dissipating wave energy with minimum wave reflection and effects on adjacent shore." (September 20, 1995 Letter Report from Chris Webb, Moffatt & Nichol Engineers, to Mr. Ron Tibbets, County of Orange, Environmental Management Agency.)

The proposed project will result in permanent replacement of approximately five acres of beach with the jetties and tidal inlet. In addition, some of the structures, such as the revetments and the lower slopes of the outer sides of the jetties, will encroach onto the beach, but will be covered by sand under average, non-storm conditions. The Service considers these impacts to be permanent, unavoidable impacts. The Service is not proposing any mitigation for this permanent loss of beach area, or for the encroachment of structures that will be covered by sand during normal, non-storm conditions.

(b) Impacts to Coastal Processes. The major project features that may alter coastal processes will be the revetments, the jetties holding open the tidal inlet, and the dynamics of the tidal inlet and flood and ebb tidal bars. Each feature will affect coastal processes in different ways.

The Service has addressed impacts from revetment construction. The proposed revetments will be situated far back on the beach, at a location where they should only infrequently be affected by waves or be in a situation where they could alter or impact coastal processes. During these

infrequent times, the impacts from the revetments could include scour, end effects, and fixing the back of the beach. The revetments are designed as a "last line of defense." As such, they could only infrequently be subject to wave action. However, during the times that they are subject to wave action, they would provide erosion protection for the support for the elevated roadbed and parking area from erosion and undercutting.

The proposed jetties will have greater and more regular impacts on shoreline processes than the revetments. The jetties will extend only to Mean Lower Low Water. This termination is being proposed so that there will be minimal interruption of longshore sediment transport and nearshore currents. A similar short jetty design was used for the recently constructed Talbert Channel and has been effective in minimizing interruption of longshore transport. Some small amount of accretion will occur upcoast of the jetties and some erosion would occur downcoast. Since the littoral transport shifts direction seasonally along this beach, the jetty impacts would be fairly small but would occur both north and south of the jetties. The Service's modeling efforts estimate that the jetties could cause up to 10 feet of erosion after they have been in place for five years, and could go up to 23 feet after 20 years.

The tidal inlet and ebb and flood tidal bars are likely to have the greatest impact on coastal processes. Under normal inlet conditions, the tidal flow in and out of the inlet will modify and interfere with both longshore currents and on-shore wave action. Flood and ebb shoals are features that develop at the ocean side (the ebb tidal bar) and the wetland side (the flood tidal bar) of most tidal inlets. For a stable inlet, the flood and ebb bars will eventually reach a state of dynamic equilibrium – growing larger and smaller to adjust to changes in tidal currents and wave climate. For a new inlet, the material that will create the ebb and flood bars will come from littoral sediment supplies and, absent mitigation, substantial downcoast erosion would occur as the ebb and flood bars become established. The ebb bar will also cause waves to break further offshore, on the shoal, and will modify and refocus local wave energy.

The size of the bars is dependent upon the tidal exchange and wave environment. For the ebb bar, once it reaches a stable size and volume, it will begin to by-pass material downcoast and a new "equilibrium" littoral transport system will develop. The equilibrium ebb bar for the Phase 1 effort is estimated to cover 1,960,000 square feet of nearshore area and require 623,000 cubic yards of sand, slightly coarser than the sands that currently exists in the nearshore area. It could take many years for the ebb bar to become completely established, but the shoal will grow quickly in the first few years, and more slowly thereafter.

It is anticipated that the flood shoal will trap 165,000 cubic yards of sand the first year, 134,000 cubic yards the second year, 64,000 cubic yards the third year, and only 10,000 cubic yards the fourth year. The equilibrium flood bar would cover 3,725,000 square feet and require 373,000 cubic yards of sand.

The 996,000 cubic yards of sand that would build the equilibrium ebb and flood bars, if taken from longshore sediment transport supplies, would result in significant erosion both north and south of the inlet. Using a conversion factor of 1.7 cubic yards of sand/square foot of dry beach, this could cause the erosion loss of 13.45 acres of dry beach north and south of the inlet.

The Service proposes several measures to avoid the erosive impacts of ebb and flood bar development. For the ebb bar, the applicant is proposing to construct or pre-fill the ebb bar for both Phase 1 and Phase 2 tidal conditions. The initial ebb bar will be constructed with 1,331,000 cubic yards of sediment that will be dredged from the tidal wetlands. During the Phase 2 project, over 400,000 cubic yards of sand will be added to the ebb bar to accommodate the increased tidal exchange that will occur with this part of the project.

The Service will also place 190,000 cubic yards of sand from the tidal inlet onto downcoast beaches as "advance fill" to offset the sand losses that are likely to occur when the flood shoal develops. The Service anticipates that the flood shoal will trap 165,000 cubic yards of sand the first year, 134,000 cubic yards the second year, 64,000 cubic yards the third year, and only 10,000 cubic yards the fourth year. The growth of the flood shoal will dampen the tidal exchange in the wetland, and to maintain full tidal action in the restored wetland area, the applicant proposes to dredge the flood shoal on a regular basis. The material dredged from the flood tidal bar will also be placed on downcoast beaches.

The intent of all these actions (pre-filling of the ebb bar, advance fill of the downcoast beaches, and routine nourishment of the downcoast beaches) is to minimize or eliminate any downcoast erosion from the tidal inlet. The Service estimates the new tidal inlet could cause over 100 feet of beach loss if no steps are taken to mitigate impacts from the jetties and inlet. With the pre-filled ebb bar and routine dredging of the flood bar, the project-induced impacts would result in about 7 feet of erosion in the first two years, but beach accretion by the fourth year of operation (7 feet in Year 4, 18 feet in Year 6, and up to 37 feet in Year 10).

(c) Possible resource impacts associated with the ebb tidal bar. The Service proposes to use 1,331,000 cubic yards of sediment to pre-fill the ebb bar. The sediment that will be used to construct the ebb bar will contain a high percentage of fines. Some samples have up to 40% fines; however the overall mix of sediment will contain slightly more than 20% fines. The 1,331,000 cubic yards of sediment on the ebb bar would provide an effective volume of 861,700 cubic yards of sandy bar material and 469,300 cubic yards of fines. The fines should be sorted by wave action and carried away from the bar; the Service anticipates that about half the fines would be lost immediately and the rest would be lost due to sediment sorting and selective transport.

Modeling for the ebb tidal bar has found that the Phase 1 ebb bar equilibrium volume is 623,000 cubic yards of sand. This is smaller than the 861,700 cubic yard effective sand volume that will remain from the initial placement of 1,331,000 cubic yards of sediment. The Service has assumed that the excess bar material will function as nearshore nourishment and be beneficial to downcoast beaches. Since the ebb bar will modify wave patterns and nearshore wave energy, the overfill bar could result in a temporary increase in the area of beach influenced by the bar. The overfill could too add to the available nourishment volume and be beneficial to downcoast beaches. The proposed beach monitoring program will provide the data necessary to compare actual beach response to the expected bounds of predicted behavior and to provide guidance for future beach replenishment needs.

The general concept of pre-filling the ebb bar appears valid and should be quite beneficial in preventing some of the clear adverse impacts that could occur if the inlet were constructed and the ebb bar were allowed to form naturally. However, there are ~~not many~~ no examples of new tidal inlets where the ebb bar was pre-filled. This lack of prior experience does not negate the clear benefits that should occur from pre-filling, but rather that the ebb bar will need to be carefully surveyed and monitored to determine whether it is performing within the limits anticipated by the modeling. This monitoring can provide feedback on the utility of pre-filling the ebb bar and useful information to insure that the Phase 2 pre-filling is performed as well (or better) than the Phase 1 effort. On November 9, 2001, the Service modified the proposed project by submitting to the Commission the "Bolsa Chica Lowlands Restoration Project Beach Monitoring Plan" **(Exhibit 15)**. This plan describes historical data and studies available for the area, and provides definition of monitoring activities and analyses that are expected to assure adverse impacts to area beaches are mitigated.

(d) Huntington Bluffs. The proposed inlet location is closer to the Huntington Bluffs than the other two alternatives. The cliffs are 3,000 feet to 7,000 south of the proposed inlet. Huntington Cliffs could be adversely impacted from both interruptions in local sediment supplies and modifications to local wave energy. In 1994, Moffatt & Nichol Engineers modeled the impacts of the proposed inlet to erosion at Huntington Cliffs. The analysis estimated that a beach width of 200 feet would be adequate to protect the back shore from erosion, but the beach at Huntington Cliffs is below this identified threshold.

Beach nourishment is the only erosion mitigation measure that the Service is proposing. Huntington Cliffs is the only location in the project area where excessive beach erosion could result in irreversible adverse impacts. In the rest of the project area, beach erosion would cause a loss of beach, but this could be corrected with sufficient nourishment. Bluffs cannot be restored with beach nourishment. However, the Beach Monitoring Plan will be used to determine the disposal locations for the periodic inlet and flood shoal dredging that is proposed for this project, as well as to determine whether there are any unmitigated adverse impacts to the adjacent beaches. The plan identified indicators of concern that would trigger erosion control measures for adjacent up and downcoast beaches, including the Huntington Bluffs site.

(e) Monitoring and Mitigation for Beach Erosion. The Bolsa Chica Beach Monitoring Plan submitted on November 9, 2001, outlines the following monitoring actions:

> *The Bolsa Chica Lowlands Restoration Project will monitor seven profiles between Warner Avenue and Huntington Pier, and 7 beach width locations, in addition to monitoring activities of the USACE, Los Angeles District. This monitoring shall continue for the life of the project or 1) until there are sufficient data on the beaches in this area to indicate that the system has reached a new equilibrium, 2) that the project is not having an adverse impact on adjacent beaches, and 3) the Commission agrees, through a formal amendment request, to modifications to the monitoring.*

The seven profiles will be measured from the back shore through the nearshore (to –35' or 40' MLLW) twice a year in the spring and fall, generally May and October, to correspond to the historical data set and capture typical post winter and post summer profile conditions. Final locations of the profiles will be selected during final design to coincide with historic profile locations. . . .

The beach widths will be monitored monthly, typically around the 20th of each month to complement the USACE data set. Six of the seven beaches will be measured at the same locations as the profiles. The beach width will not be measured at the Huntington Cliffs location (378+29); the beach width location for this section of beach will be measured at "The Ramp" (approximately Station 360). The final precise locations will be defined during the final design phase of the project.

As a task during construction, a hydrographic survey of the pre-construction bathymetry and post-construction bathymetry in the region of the ebb shoal will be obtained. The detailed quantitative monitoring of the geomorphic evolution of the ebb shaol will not be obtained, however, it is expected that several beach profiles will transect the constructed ebb shoal and provide qualitative information on redistribution of the pre-fill sediments. The primary monitoring effort is focused on the sub-aerial beach that is more easily measured and has a more direct connection to recreational beach use and coastal storm damage protection.

(f) Routine Nourishment. The Beach Monitoring Plan will be used to determine the disposal locations for the periodic inlet and flood shoal dredging that is proposed for this project . The plan identified the following actions:

1. If there are no indicators of erosion on adjacent beaches, the dredge disposal material will be spread on adjacent beaches within economical transport distant (within 5000 feet of the inlet location).

2. If there are indicators of erosion on adjacent beaches, dredge material, and other offshore sediment shall be used to address this erosion, regardless of location or economical transport concerns. Two erosion triggers have been developed now; additional triggers can be developed in the final plan.

a. Acute Erosion: Any beach is found to be narrower than 50', based on two consecutive monthly beach width measurements.

b.Chronic Erosion: Any 12-month rolling average of beach widths which deviate more than 2 standard deviations from the mean beach width, using 20 year historic record to establish these means and standard deviations (see Table 1).

3. If periodic monitoring indicates either acute or chronic erosion (based on the above triggers or other triggers developed in the final plan), a meeting shall be convened within one month of the identification of concern and shall provide for participation by all

interested parties, including but not limited to the California Coastal Commission, the U.S. Army Corps of Engineers, the City of Huntington Beach, and project managers. Within two months, the project managers shall have developed and be in the process of implementing all necessary steps to address the identified erosion.

Once the final locations of the shoreline profiles and beach width monitoring sites are determined (after final project design work is completed), the Service committed to provide to the Commission shoreline maps illustrating those precise locations.

(g) Sea Level Rise. The Commission staff examined the sea level change estimates used by the Service in their design of the wetland restoration project. The Service anticipated a rise of 0.9 feet in 100 years. This figure is somewhat lower than some environmental groups recommend, but is nevertheless a reasonable figure and within the accepted range of possible sea level rise scenarios.

(h) Conclusion. The proposed Bolsa Chica Lowlands restoration project included elements to minimize and avoid adverse effects on adjacent beaches and shoreline processes. With the modifications made to the project, as outlined in the Beach Monitoring Plan submitted to the Commission on November 9, 2001, the Commission finds that the proposed restoration plan now contains adequate provisions for monitoring of coastal processes and maintenance of adjacent beaches, and is consistent with the shoreline processes and coastal structures policies of the CCMP.

C. PUBLIC ACCESS AND RECREATION. The Coastal Act provides:

Section 30210

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Section 30211

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,

(2) Adequate access exists nearby, or,

(3) Agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway. . . .

Section 30213

Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred. . . .

Section 30214

(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:

(1) Topographic and geologic site characteristics.

(2) The capacity of the site to sustain use and at what level of intensity.

(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.

(4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter. . . .

Section 30220

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Section 30221

Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.

Section 30007.5

The Legislature further finds and recognizes that conflicts may occur between one or more policies of the division. The Legislature therefore declares that in carrying out the provisions of this division such conflicts be resolved in a manner which on balance is the most protective of significant coastal resources. In this context, the Legislature declares that broader policies which, for example, serve to concentrate development in close proximity to urban and employment centers may be more protective, overall, than specific wildlife habitat and other similar resource policies.

The Final EIR/EIS states that:

> *Bolsa Chica State Beach extends approximately six miles from Warner Avenue at the north end of the project area southward to the Huntington Beach Municipal Pier. . . . Recreational facilities are located along a three-mile northern segment of the beach and include 2,200 parking spaces, 100 camping spaces, five concession plazas, 550 fire rings/barbecue pits, 14 restrooms, 28 cold-water showers, and a handicapped access ramp across the sand. Parking along PCH was prohibited in 1981, and uncontrolled access to the beach was also precluded by fencing that runs the length of the state parking lot.*
>
> *Approximately 3 to 4 million people currently visit Bolsa Chica State Beach annually. Based on daily parking and annual parking pass users, peak daily usage is approximately 65,000 people over the 2-mile stretch of Bolsa Chica State beach (Personal communication, D. Ito, 2000).*

The consistency determination examines the expected impacts on access and recreation in the Lowlands and on Bolsa Chica State Beach as a result of the proposed project:

> *Beach areas about 800 feet north and south of the proposed tidal inlet* [and the 400-foot-wide inlet corridor] *would be closed to public access during construction of the PCH bridge and tidal inlet. This closure could result in long-term, temporary, significant, adverse (Class II) land use and (Class I) recreation impacts affecting use of the beach during summer holidays and weekends. Other adjacent land uses would not be significantly affected by project construction activities (Class III). During all phases of construction, public safety would be protected by use of barriers, signs, flagmen, and fences where applicable; therefore, no significant, adverse (Class III) impacts would occur.* [In addition, the Service confirmed that the existing bicycle-pedestrian trail along Bolsa Chica State Beach will be maintained for public use throughout the three-year construction period via the PCH detour, and this trail will provide public access to that portion of the State Beach south of the inlet construction zone.]
>
> *Inlet construction would result in a temporary loss of surfing use at Lots 14 and 15, and would constrain the already heavily used Lots 23 and 24, resulting in a temporary, significant, adverse (Class I) impact during all four seasons.*
>
> *Construction of the proposed tidal inlet would result in the permanent loss of beach as a result of land to water conversion. This impact would be adverse but insignificant (Class III). The continuity of the beach would be broken and would affect beach users traversing the length of the beach. Access across the inlet would be provided on the PCH bridge via a pedestrian access crossing, reducing the impact of breaking beach continuity to adverse but insignificant (Class III). The surfing experience would change as a result of construction of the tidal inlet. This difference would be perceived in different ways and would result in adverse but insignificant (Class III) impacts because some surfers would view the change as beneficial and some would not.*

. . .

The existing loop trail and Ecological Reserve parking lots will remain. The existing trespass along the flood channel levees would continue, although measures to reduce damaging incursions into the lowland from this area will likely be implemented. The existing bicycle-pedestrian trail along the beach will be maintained by rerouting the trail across the inlet on a portion of the new bridge, separate from the PCH traffic lanes. This separate section of the bridge will also provide beach safety vehicle access across the inlet. Caltrans approved detours would maintain PCH traffic flow throughout construction. The existing exit from the beach park to PCH would be reconstructed. Temporary reduction in the number of parking slots on the State Beach due to inlet construction safety requirements will be insignificant, except on peak use days. (At this time, due to State Park's reconstruction of all the restrooms at Bolsa Chica State Beach, all restroom facilities have been replaced with portable toilets and about 1,300 parking slots are unavailable through the peak beach use months.) No beach facilities would be permanently reduced as a result of the Proposed Project.

Environmental interpretation and education and related public access and facilities will be an integral part of later planning for the Project [**Exhibit 16**]. *The expected focus will be on suitability and location for trails and kiosks and seasonal protection of high bird use areas. The actual planning for interior trails and seasonal public access will be conducted by the long-term land manager after construction is complete, in consideration of sensitive wildlife uses and safe operation of continuing oil field operations. Potential connection to existing or proposed trail systems outside the Lowland must await consideration of those properties adjacent to the lowland. Improved public access connections to the State Beach may be considered at a future date, as well.*

The lowland Project area is not suitable for intensive recreational uses. The goal of the Project is to restore a currently degraded wetland ecosystem to a productive, biologically diverse ecosystem. As such, intensive recreational uses inside the wetland area would be in conflict with the goals of habitat restoration and wildlife conservation. After wetland restoration is complete, trails and interpretive kiosks will be considered as a means of meeting the proponent's environmental interpretation and fish and wildlife education missions, as well as, the public access and recreational policies of the California Coastal Act. Also, continued safe operation of a portion of the existing oil field is expected to preempt most public access in the south end of the lowland for many years.

Waterborne recreation will be considered only where consistent with the primary purposes of fish and wildlife resource conservation. The inlet channel and jetties are not intended to be navigable, but will be designed and implemented to retain and protect the existing recreational uses of the State Beach Park to the maximum extent possible. The inlet is expected to attract recreational fishing interest. The ebb shoal may create a more appealing surf break than currently exists, drawing more surfers to this section of beach than occurs now. Public access and State Beach safety and maintenance vehicle access would be retained across the inlet channel, separate from the Pacific Coast Highway bridges.

The construction of the inlet unavoidably requires the replacement of beach strand with an ocean connection. Just as the many acres of asphalt parking lot covering beach sand enables public access to the remaining sand, there must be an inlet across the beach to obtain the sought after biological improvements in the restored wetland. About 4 acres of ocean beach, lightly used by sunbathers except on peak use days would no longer be suitable for sunbathing purposes. This reduced recreational use would likely be offset as indicated above by other coastal recreational uses.

The proposed project will generate significant, adverse effects on public access and recreation, including surfing, at Bolsa Chica State Beach due primarily to the construction of the ocean inlet and the resultant loss of approximately five acres of sandy beach (**Exhibit 17**). While the project includes construction and post-construction mitigation measures (a pedestrian and bicycle bridge across the inlet) to minimize the disruption of lateral access along the shoreline due to the inlet, the permanent loss of approximately five acres of sandy beach to the ocean inlet cannot be adequately mitigated. This element of the project is inconsistent with the aforementioned public access and recreation policies of the Coastal Act.

However, as noted elsewhere in this report, the construction of an ocean inlet is essential in order to restore full tidal function to the Bolsa Chica Lowlands. Restoration of the Lowlands with the ocean inlet will generate 366 acres of full tidal habitat and 200 acres of muted tidal habitat, protect 120 acres of existing seasonal pond habitat, and provide for a future full tidal habitat of 252 acres. The range of wetland habitats proposed for the Lowlands will also serve as mitigation for landfill construction in the Ports of Los Angeles and Long Beach, as provided for in the Interagency Agreement that led to the funding by the Ports of the purchase and restoration of the Lowlands. Commission concurrence with CD-115-96 (USFWS) for the Concept Plan for wetland restoration at Bolsa Chica and certification of port master plan amendments for landfill mitigation credits rested in large part on the construction of the proposed ocean inlet to create full and muted tidal habitat in the Lowlands. Mitigation credits for landfill construction were released to the Ports in early 1997 after purchase and restoration funds were transferred to the State Lands Commission, and hundreds of acres of landfills have been or are presently under construction in both ports. Without construction of full and muted tidal wetlands in the Bolsa Chica Lowlands via an ocean inlet, the existing significant adverse effects on marine habitat and resources from port landfill construction would go unmitigated. Allowing this situation to occur would be inconsistent with the landfill and marine habitat mitigation policies of Section 30233(a) of the Coastal Act.

The Commission is then left with weighing these two Coastal Act inconsistencies – the absence of mitigation for the loss of five acres of sandy beach to the proposed ocean inlet and the loss of mitigation for 534 acres of marine habitat being filled in outer harbor waters within the ports. The project creates a conflict between the access and recreation policies of Chapter 3 of the Coastal Act on the one hand and the Chapter 3 marine resource policies on the other. The wetland restoration and marine habitat benefits that would arise from the Bolsa Chica wetlands restoration project are hugely significant both on a regional and national scale. However, the access and recreation impacts, while significant and adverse, are nevertheless not as significant.

The loss of five acres of sandy beach due to the 400-foot-wide inlet connecting the Lowlands and the Pacific Ocean must be evaluated in part within the context of the nine miles of public beach that stretch from Orange County's Sunset Beach (adjacent to the north end of Bolsa Chica State Beach) south through Huntington City and State Beaches and to the Santa Ana River jetties.

Under Section 30007.5 of the Coastal Act (resolving conflicts between competing Coastal Act policies), the proposed project presents a conflict between competing policies of the Coastal Act, in that it promotes restoration of the Bolsa Chica wetlands but also results in the physical loss of public beach due to construction of the ocean inlet component of the restoration project. Section 30007.5 provides that:

> *The Legislature further finds and recognizes that conflicts may occur between one or more policies of this division. The Legislature therefore declares that in carrying out the provisions of this division such conflicts be resolved in a manner which on balance is the most protective of significant coastal resources. In this context, the Legislature declares that broader policies which, for example, serve to concentrate development in close proximity to urban and employment centers may be more protective, overall, than specific wildlife habitat and other similar resource policies.*

In conclusion, on balance it is more protective of coastal resources to resolve this conflict in a manner allowing the loss of sandy beach, due to the significant natural resource benefits that will arise from construction of an ocean inlet across Bolsa Chica State Beach.

D. <u>WATER QUALITY</u>. The Coastal Act provides:

> **<u>Section 30230</u>**
>
> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*
>
> **<u>Section 30231</u>**
>
> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Huntington Beach, to the south of the project site, has in recent years experienced persistent shoreline water quality problems due to several potential sources of contamination. Concerns have been raised over the potential for similar adverse water quality impacts along the Bolsa Chica shoreline as a result of proposed project construction activities, oilfield contamination clean-up, and the operation of restored tidal wetlands in the Bolsa Chica Lowlands, in particular

the potential relation between wetland functions and bacterial contamination of nearshore coastal waters. This staff report examines this new issue and more routine water quality matters in the context of the proposed project.

1. Current Water Quality Conditions in the Lowlands and Immediate Offshore Waters. The Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project states:

> *The Bolsa Chica Lowlands and wetlands are part of a semi-enclosed coastal body of water. Ocean Waters enter the system through Anaheim Bay, pass through Huntington Harbour, and enter Outer Bolsa Bay through a narrow channel under the Warner Avenue Bridge. Outer Bolsa Bay is the only area within the wetlands that has full tidal conditions. Tidal waters flow between Outer and Inner Bolsa Bay through tide gates that partially restrict tidal exchange. The tidal range of Inner Bolsa Bay is muted to about 22 percent of that of Outer Bolsa Bay. Water quality within Bolsa Bay is dependent on the quality of the water entering through Huntington Harbour.*
>
> *Over the past century, the lowlands have been altered extensively by the construction of dikes, channels, tide gates, and roads; oil development; and agricultural and urban development in the surrounding area. The Lowlands consist of a series of diked, nontidal ponds landward of Bolsa Bay. Some of these ponds are connected by culverts and some are isolated. The amount of surface water in the Lowlands varies seasonally and with the amount of rainfall in a given year. In some areas, ponding of fresh water on saline soils has resulted in the creation of brackish water environments. The non-tidal areas are separated from Bolsa Bay by a dike built in 1978. Bolsa Bay and the Lowlands are an expansive complex of tidally influenced saltwater areas and perennial and seasonal brackish and freshwater areas.*
>
> *Stormwater and urban runoff represent other input sources of waters into Bolsa Chica. The EGGW Flood Control Channel discharges stormwater runoff from the watershed into Outer Bolsa Bay through one-way flap gates. Urban runoff enters the Bolsa Chica Lowlands from the Springdale Pump Station, which drains dry and wet weather runoff to Lake Signal and the Freemen Creek drainage. Additional urban runoff enters the Lowlands from Huntington Beach Mesa, particularly from the Seacliff culvert that drains water from a housing development and golf course onto the southern boundary of the site. Non-point source runoff from the Pacific Coast Highway (PCH) also may enter the site from along the western boundary. [EIR Vol. 1, 3.4.1, pages 3-38 and 3-39]*

To protect beach-goers from exposure to waterborne disease, a new state law (AB 411) mandates the implementation of recreational water quality monitoring programs at public beaches with 50,000 or more annual visitors. Specifically, the law requires monitoring for total coliform (TC), fecal coliform (FC), and the enterococcus (ENT) groups of bacteria, all of which may indicate the presence of fecal contamination. The state also enforces a set of uniform standards for TC, FC, and ENT bacteria including single-sample standards (10,000, 400, and 104 most probable number (MPN) or colony forming units (CFU)/100 mL), and 30 day geometric mean standards (1000, 200, and 35 MPN or CFU/100 mL); a lower single-sample standard for TC of 1,000 MPN

or CFU/100 mL also applies when the TC/FC ratio falls below 10. The enterococci standard conforms closely to the national guidelines for marine water quality criteria published by the U.S. Environmental Protection Agency. If indicator bacteria levels in the ocean exceed any of the above standards, the local health officer is required to either post signs that warn against swimming in the water, or close the ocean to the public if a sewage spill is suspected. The state standards and U.S. Environmental Protection Agency guidelines are based on a series of epidemiological studies that link gastrointestinal illness and exposure to ocean water containing high levels of indicator bacteria, particularly ENT. The origin of ENT in these epidemiological studies was presumed to be anthropogenic sources of fecal pollution, such as sewage, agricultural runoff and urban runoff. (Above information from: Generation of Enterococci Bacteria in a Coastal Saltwater Marsh and Its Impact on Surf Zone Water Quality, S. Grant, et al., March 2001)

Daily to weekly monitoring for bacteria in the surf zone in the vicinity of Bolsa Chica is conducted by the County Sanitation Districts of Orange County, and reported to the County's public health department. On average, coliform densities at this location are within California Ocean Plan water contact standards during dry weather months; however, the standards are often exceeded after rains.

Regarding EGGW Flood Control Channel and offsite water flows into the Lowlands, the Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project states:

> *The watershed surrounding the Bolsa Chica wetlands is occupied by a number of concrete flood control channels, primarily the EGGW/Oceanview Flood Control Channel system. This system collects and conveys runoff from a watershed of approximately 27 square miles northeast of Bolsa Chica that includes the cities of Huntington Beach, Fountain Valley, Westminster, Garden Grove, Santa Ana, Orange, and Anaheim. The watershed of the EGGW Flood Control channel is approximately 85 percent urbanized, and the remaining vacant and agricultural land is expected to be fully developed in the next 50 years. [EIR Vol. 1, 3.3.2.1, page 3-37]*
>
> *The EGGW Flood Control Channel receives flow from two upstream channels that originate in Garden Grove and Fountain Valley. In the project area, the main channel is unlined and runs through the northwest portion of the Lowlands. The channel terminates with one-way flap gates at the south end of Outer Bolsa Bay. From Outer Bolsa Bay, runoff is conveyed through Huntington Harbour, Anaheim Bay, and ultimately, to the Pacific Ocean. Except during and immediately following rainfall, flow in the EGGW Flood Control Channel is negligible. The EGGW Flood Control Channel is currently being upgraded to convey the 100-year storm. The improvements will occur over an extended period of time. [EIR Vol. 1, 3.3.2.1, page 3-37]*
>
> *As discussed above, there is some limited uncontrolled flow into the Bolsa Chica Lowlands from Huntington Mesa. The remaining runoff from the Mesa is generally routed to the EGGW Flood Control Channel via the Slater Storm Channel and Slater Pump Station. [EIR Vol. 1, 3.3.2.1, page 3-37]*

Immediately east of the Site, runoff from a 184-acre residential area, generally bounded by Whittford Lane, Halcroft Lane, and Central Park Drive is discharged into Freeman Creek through the Springdale (i.e., Bolsa Chica) pump station. [EIR Vol. 1, 3.3.2.2, page 3-38]

2. Water Quality Benefits and Improvements from the Proposed Project. The Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project states:

The Project will result in the restoration and protection of environmentally sensitive habitat areas. The Project will provide for the retention and enhancement of existing fish and wildlife resources by reestablishing areas of full tidal influence in the wetland ecosystem. The new full tidal basin would occupy approximately 366.5 acres in the central Lowlands. Approximately 200 acres of additional Lowlands would be connected to the full tidal basin by culverts to establish a muted tidal area. Approximately 120 acres in the southeast area of the Lowlands would remain as seasonal ponds.

Water quality in the newly constructed full tidal basin is expected to be excellent. Full tidal flow would provide saline waters with nutrients and dissolved oxygen. Adequate tidal exchange would ensure water quality within the range of seawater. Residence time would be less than 1.5 days. Water temperature may increase due to the shallower depths of the wetlands compared to coastal waters; however, these increases would be slight due to the constant renewal by tidal flushing. Waters in the muted tidal basin would have less tidal flushing. Therefore, the range of water quality values in the muted tidal basin would be more extreme than that in the full tidal basin. [EIR Vol. 1, 4.4.2.1, page 4-40]

Water quality would be affected by several components of construction, including dredging to create the new basin, deposition of the resulting material in to the nearshore zone of the ocean, construction of an ocean inlet to the basin, and deposition of material from the inlet construction onto the beach. Most of these impacts are related to temporary increases in turbidity resulting from these construction activities.

The Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project states:

Resuspension and subsequent settling of fine particles in the dredged materials result in turbidity. Factors affecting the settling of suspended material include physical characteristics of the sediment (grain size, organic content, mineralogy) and chemical characteristics of the water (temperature, salinity, pH, and turbulence). Silts/clays remain in suspension longer than sands, high turbulence contributes to increased sediment resuspension, and high current speeds will transport turbidity plumes greater distances than low current speeds. [EIR Vol. 1, 4.4.2.1, page 4-37]

Following dredging, the new tidal basin would be opened to the ocean via the new inlet. Turbidity within the new tidal basin, inlet and nearby coastal waters may be above

background for a short time until fine sediment is flushed out. (Sediments with contaminant concentrations above screening levels would have already been removed, so resuspension of contaminants is unlikely). [EIR Vol. 1, 4.4.2.1, page 4-39]

Increases in turbidity are expected in nearshore waters during prefilling of the ebb bar, and possibly during the construction of the inlet and placement of excavated material (from the inlet construction) on the beach. Turbidity plumes resulting from prefilling of the ebb bar would spread upcoast and downcoast via offshore currents. The distance and extent of the plumes would be determined by the actual grain size dredged, amount of silt/clays, production rate, and oceanographic conditions. For the most part, turbidity plumes would extend parallel to the shoreline given the predominant longshore current flows. However, this condition clears rapidly once the dredge discharge ceases. This activity would occur primarily during the fall and winter months, when turbid conditions commonly occur during rainfall events when river runoff spreads turbid water along the coast. [EIR Vol. 1, 4.4.2.1, page 4-37]

Turbidity related to inlet construction and placement of excavated material on the beach is expected to be minimal and highly localized due to the low volume of material and the nature of the material itself (beach materials previously subjected to natural mixing and resuspension).

3. Water Quality and Bird Excrement. The Final Consistency Determination for the Bolsa Chica Lowlands Restoration Project states:

Due to the advent of AB 411 monitoring of surf zone bacteria and public warning thresholds in 1999, and the resultant series of beach warning postings and occasional closures in Huntington Beach centered around the Santa Ana River mouth and the sanitation district outfall discharges, water quality influences upon beach recreational uses have attracted much attention. It has been suggested by some that the creation of a new tidal inlet at Bolsa Chica would result in extensive beach closures such as those that have occurred in Huntington Beach. Large-scale and expensive studies have been undertaken by others to learn more about the situation in south Huntington Beach, such as, off-shore sampling to track sewer outfall discharges and thermal upwelling at the AES power plant cooling water discharge, and 24-hour bacterial sampling in the Santa Ana River and Newport Slough . To date, we have found no data or science based information that supports the view that tidal wetlands will cause chronic, wide-spread, or significant beach postings or closures. [The Final Consistency Determination for the Bolsa Chica Lowlands Restoration Project, 4.3, pages 34 through 37]

See **Appendix C**: "Generation of Enterococci Bacteria in a Coastal Saltwater Marsh and its Impact on Surf Zone Water Quality" by S.B. Grant, et al.

Substantial comments were submitted to the Service during the EIS/EIR comment period related to the potential bacterial contamination of nearshore waters. The Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project analyzed and responded to these comments as follows:

Many commenters expressed a concern that even though the Proposed Project would not route the water from the EGGW Flood Control Channel through the new full tidal basin, bacteria generated by birds and other wildlife in the resultant wetlands might cause an exceedance of bacteria standards in the ocean. Several commenters suggested that the creation of a new tidal inlet at Bolsa Chica would result in extensive beach closures such as those that have occurred in Huntington Beach. The discharge from the Talbert Marsh was initially suspected as the cause for the Huntington Beach closures.

The results of the Huntington Beach water quality investigation became available in November 2000 and were reviewed by the preparers of this EIR/EIS. The Huntington Beach studies showed that the levels of bacteria generated within the marsh contributed to the bacteria problem, but were not sufficient, in and of themselves, to account for the problem itself. Specifically, the studies showed that bacteria generated by birds in Talbert Marsh could cause bacteria concentrations in the surf line near the marsh to briefly exceed criteria on outgoing nighttime or early morning tides. The study further concluded that fecal material deposited by western gulls is a significant source of indicator bacteria in the water flowing out of the Talbert Marsh and that indicator bacteria growing on vegetation in the marsh and in marsh sediments may also contribute to the nearshore loading of these microorganisms. The study additionally concluded that the levels of bacteria recorded along the beach were higher than could possibly have been generated by Talbert Marsh alone and that there has to be another source. Finally, the Talbert Marsh investigation included a study using a nearshore transport model showing bacteria transport from Talbert Marsh along the shore. The modeling indicated that it is physically impossible for the levels of contamination measured at the beach to be caused by Talbert Marsh and the lower Santa Ana River/Newport Slough system combined. This result supports the hypothesis that another source must be involved.

These data suggest that bacteria within the wetlands at Talbert Marsh may cause bacteria standards to be exceeded in the ocean. However, the Talbert Marsh, with its large area of mud flat and small volume of open water, has a different configuration than many other coastal wetlands and the large full tidal basin that would be created at Bolsa Chica by the Proposed Project. In addition, Talbert Marsh supports an unusually high number of western gulls and to a lesser degree, elegant terns. The peak number of birds counted in Talbert Marsh during the Huntington Beach study ranged from 200 to 1,000 individuals, i.e. 8 to 40 birds per acre. It is expected that Bolsa Chica would not attract a high density of gulls such as does Talbert Marsh. Specifically, gulls are attracted to garbage and several garbage sources are found near Talbert Marsh, which is closer to developments than the Bolsa Lowlands. Gulls exploit these sources and then rest on the large amount of intertidal mudflat at Talbert Marsh.

A year's worth of detailed bird counts was done at Bolsa Chica (Guthrie et al. 1993). This study counted birds at Bolsa Chica every two weeks for a year in 1992 and 1993. The density of gulls and terns counted in this study in Inner and Outer Bolsa Bay would be expected to be representative of potential gull and tern density in the Bolsa Chica

Lowlands when tidal flow is restored. Except for May, June and July, 1992, when the total number of gulls and terns in Bolsa Bay was as high as 865 because of a large number of terns nesting on islands in Inner Bolsa Bay, the total number of gulls and terns was always less than 250 and was as low as 10 in August of 1992.

Thus, the highest density of gulls and terns in the 175 acres of tidal wetlands in the Bolsa Chica Ecological Reserve was less than 5 gulls or terns per acre. Western gull numbers in all of Bolsa Chica never exceeded 11. The most abundant gull at Bolsa Chica was the smaller California gull. Numbers of gulls and terns in Bolsa Bay in excess of 100 was always recorded in Inner Bolsa Bay and was a result of nesting terns on the two tern islands. The highest density of gulls and terns in Outer Bolsa Bay, where there are intertidal mudflats where gulls could rest as they do at Talbert Marsh, was 15. The amount of feces and associated bacteria is directly proportional to the body weight of a bird. Thus, the fact that the birds that would be expected to occur in highest numbers at Bolsa Chica (terns, smaller gulls, ducks, shorebirds) are all smaller than and in less concentrations than the western gulls that occur in such high numbers at Talbert Marsh indicates that even less of a bacteria problem from wildlife would be expected at the Proposed Project.

Although close in proximity to Bolsa Chica, Talbert Marsh is not an appropriate comparison to the Proposed Project due to the variety of physical differences between the wetlands. Talbert Marsh is much smaller in size than Bolsa Chica, with one-fifth (20%) of the tidal prism and is, therefore, unable to dilute contaminants. The dilution that will occur in Bolsa Chica is many times (approximately 5 times) greater than that occurring at Talbert Marsh. Potential contamination in tidal flows will be low enough when it reaches the ocean that beach closures should not occur.

Also, Talbert Marsh was designed with a proportionally large mudflat area that is exposed at low tide and inundated at high tide. Only a very small channel area is inundated at low tide. Birds feed, loaf and excrete on the exposed mudflat at low tides. Excretions are subsequently mobilized and contributed to the small tidal basin at rising tides and transported throughout the marsh. They are then carried out to the surf zone during a dropping tide and contributed to the ocean. In comparison, Bolsa has a relatively small mudflat area in proportion to the total wetland area. Therefore, lower concentrations of excretions are expected at Bolsa Chica.

There is no evidence that shows that bacteria from birds pose a threat to human health. However, without focused epidemiological studies, the potential for human health effects cannot be entirely discounted.

Talbert Marsh receives urban runoff directly from a large urbanized portion of Huntington Beach and Fountain Valley. Urban runoff contains bacteria that are contributed to pump stations upstream of Talbert Marsh each day. Bacteria breed in conditions present at pump stations, further increasing bacteria levels contributed to Talbert Marsh. In contrast, the Proposed Project does not include a connection to the

EGGW flood control channel. Therefore, the contamination that is contributed to Talbert Marsh from outside of the system will not occur in the Proposed Project.

To determine for the FEIR/EIS whether the bacteria problems associated with Talbert Marsh were typical of coastal wetlands, 1999 beach posting data were obtained from the Natural Resources Defense Council, and summarized as follows:

The greatest amount of postings near wetlands were on beaches near Carpinteria Marsh and Goleta Slough in Santa Barbara County. The higher number of postings near these wetlands, compared to wetlands in the southern counties, is consistent with the overall higher number of postings and greater number of days posted in Santa Barbara County. The four postings at Carpinteria City Beach adjacent to Carpinteria Marsh were either associated with rainfall events or attributed to urban runoff. Similarly, the Goleta Beach postings were either associated with rain or urban runoff.

San Elijo Lagoon in San Diego County is frequently closed to the ocean. When the mouth is closed, pollutants build up inside the lagoon. Most of the 1999 beach postings at Cardiff State Beach occurred when the sandbar at the mouth of the lagoon was breached and accumulated pollutants were released to the ocean. Some beaches adjacent to wetlands, such as Carlsbad State Beach, adjacent to Agua Hedionda had no postings in 1999.

These data show that beaches near tidal wetlands do not have chronic beach postings. Postings on beaches near tidal wetlands are similar or lower than beaches that are not near tidal wetlands. Overall, beaches near tidal wetlands had an average of about 2 postings for 12 days in 1999 while beaches not near wetlands had an average of about 3 postings for 32 days.

(Details of this analysis can be found in the Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project, Volume V – Responses to Comments and Comment Letters and Mitigation Monitoring Plan, Section 2.2.3, Pages 2-3 through 2-9.)

The Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project further states:

Finally, bacteria data within wetlands were examined to determine if bacteria generated by organisms within the wetlands caused bacterial standards to be exceeded within the wetlands. Table 2-3 shows monthly bacteria data collected by the County of Orange Environmental Health Division in Bolsa Bay and the EGGW Channel between August 1997 and May 2000. These data show that, except in rain events when large amounts of pollutants are introduced to Bolsa Bay from the EGGW Channel, the bacteria standard for a single sample was exceeded on only one occasion in Inner Bolsa Bay near the pedestrian bridge when the fecal coliform standard was exceeded. In Huntington Harbour at Warner Ave. where flows from Bolsa Bay exit the wetlands, there also was only one dry weather exceedance of bacteria standards, again for fecal coliform. Thus, in spite of the large number of birds that use Bolsa Bay, bacteria concentrations in the

water are usually low. These data suggest that the Talbert Marsh situation may be unusual and that wetlands would not necessarily be expected to generate high enough levels of bacteria to result in beach postings. Data on bacteria levels measured by the County of Orange Environmental Health Division at Northstar Beach at the lower end of Upper Newport Bay were also examined. Upper Newport Bay receives runoff from storm drains and San Diego Creek and also contains marinas which may contribute bacteria. However, weekly bacteria measurements between January 1999 and November 2000 indicated only one dry weather exceedance of single sample bacteria standards at Northstar Beach. Large numbers of birds use Upper Newport Bay. Again the data suggest that exceedance of bacteria standards in tidal wetlands is not typical.

In summary, existing information does not support a conclusion that the Proposed Project will cause or significantly contribute to high bacteria counts that necessitate additional beach closures.

(Details of this analysis can be found in the Final EIR/EIS for the Bolsa Chica Lowlands Restoration Project, Volume V – Responses to Comments and Comment Letters and Mitigation Monitoring Plan, Section 2.2.3, Potential Exceedance of Bacterial Standards in the Ocean from Bacteria Generated by Birds and Wildlife in the Wetlands, Pages 2-3 through 2-9.)

Subsequent to the release of the Final EIR/EIS, numerical modeling of potential water quality impacts from bird use of Bolsa Chica wetland was recently performed by Moffatt and Nichol Engineering (Letter to State Coastal Conservancy, from Michael J. McCarthy, P.E., Moffatt and Nichol Engineers, July 18, 2001)(**Appendix D**: "Final Letter Report, Numerical Modeling of Potential Water Quality Impacts from Bird Use of the Bolsa Chica Wetland", Moffatt & Nichol, July 18, 2001). This modeling evaluated: (1) a reasonable worst case scenario of bird use of the wetlands, tidal conditions and resultant enterococci bacteria concentrations; and (2) a worst case scenario (essentially inflating the impacts of the reasonable worst case scenario by a factor of five). In summary, the modeling for scenario 1 indicated:

The highest predicted enterococci bacteria concentration levels for the worst case condition in the marsh and nearshore area over the entire 45-day modeling period are two orders of magnitude lower than the applicable state criteria (AB411 30-Day Geometric Mean Standard of 35 MPN/100 ml). Therefore, no beach closures would occur from bird use of the marsh under the assumptions used for this analysis. In order to each an exceedance of the criteria, the concentration of bacteria would have to be increased 170 fold in the marsh. No physical (decreased tidal prism) or biological conditions (increased bird use) are anticipated for this to occur with the proposed project.

Furthermore, modeling for scenario 2 indicated:

The highest predicted enterococci bacteria concentration levels for the worst case condition in the marsh and nearshore area over the neap tide modeling period are one order of magnitude lower than the applicable state criteria (either the AB411 30-Day

Geometric Mean Standard of 35 MPN/100 ml or the instantaneous standard of 104 MPN/100 ml). Therefore, no beach closures would occur from bird use of the marsh under the assumptions used for this analysis. In order to reach an exceedance of the criteria, the concentration of bacteria would have to be increased 16 fold in the marsh. No physical (decreased tidal prism) or biological conditions (increased bird use) are anticipated for this to occur with the proposed project.

The U.S. Fish and Wildlife Service submitted additional analysis on this matter after the August 9, 2001, Commission hearing on CD-061-01 and is presented in **Exhibit 18**. The Service summarized this analysis as follows:

In summary, there is no evidence of human health hazard from southern California tidal salt marshes used by thousands of birds, or increased health warning postings that can be attributed to the tidal salt marsh ecosystem. Bird feces contain the same bacteria as are used as AB 411 indicator bacteria. We modeled the movement of bacteria from reasonable and "worst-case" bird defecation concentrations in the proposed fulltidal basin. We concluded that the tidal basin would not contribute to beach postings at Bolsa Chica State Beach even if used by incredibly high concentrations of birds. Lastly, the proposed tidal basin would have no urban runoff or sewage routed through it to the beach.

It is expected that AB 411 monitoring will continue in the manner called for in the law or as the law may be revised. Monitoring of bacteria within the proposed Bolsa Chica tidal wetland appears unwarrented, at this time. Similarly, development of a remediation plan, in the absence of a problem, also seems unwarrented.

In conclusion, the Commission has reviewed the consistency determination, the public comments and letters submitted during the public comment period, the most recent water quality research, and the analysis and response to comments presented in the EIR/EIS related to this issue. The Commission agrees with the conclusions presented in the consistency determination that the restoration of the Bolsa Chica wetlands will not result in significant impacts to water quality or beach closures resulting from bird use of the marsh and wetlands area. The Commission believes that the conclusions of the Final EIR/EIS are supported by analysis of the available data and most recent research. Water quality along the beaches and surf zone will continue to be monitored in accordance with the requirements of AB411. Research will continue into the relationship between wetlands and beach and nearshore water quality, and the Commission staff will continue to evaluate all applicable water quality research as it becomes available. In addition, if, after construction of the proposed wetland restoration project, there are unexpected adverse water quality effects in the coastal waters offshore of the proposed ocean inlet, and if those effects can reasonably be assumed to be related to the wetland restoration project, then the Commission, under Section 930.45 of the federal consistency regulations, can re-open the consistency determination in an effort to determine whether the project continues to be conducted in a manner consistent with the CCMP.

4. Water Quality and Dredged Material Disposal. Approximately 1.33 million cu.yds. of material excavated and dredged from the Lowlands to create the tidal basin and ocean inlet will

be disposed in the nearshore zone off Bolsa Chica State Beach, another 190,000 cu.yds. will be placed directly on the State Beach south of the ocean inlet, and approximately 822,000 cu.yds. would be placed within the Lowlands to construct levees and nesting islands. The potential impacts from disposal of this material on marine water quality include increased turbidity, placement of fines, reductions in dissolved oxygen, and potential resuspension of any chemical contaminants present in the dredged materials. These localized water column impacts will in turn affect fish and marine birds in the project area.

The Service has provided information in the Draft and Final EIR that the main impact from placing a high volume of fines into the nearshore environment will be aesthetics. The sediment plume will definitely be visible while the ebb bar is being pre-filled, and for some undetermined period after construction is completed. The Service notes that the impacts from this project will be similar to the impacts from the beach nourishment projects that are undertaken regularly at Surfside/Sunset. However, the material used for nourishment at Surfside and Sunset usually has a fines content of 15% or less, where this project will have a percentage of fines at approximately 20%. Also, Surfside and Sunset are constructed as beach nourishment projects with controlling weirs and silt curtains to limit the concentration of fines in the runoff. The Service has not proposed any equivalent control features for the proposed project, and there are few possible turbidity controls for nearshore operations. However, unlike Sunset/Surfside, the construction will occur during the late fall and winter months when there are often high background levels of fine sediments from coastal streams and rivers and storm events. The turbidity impacts from this project may be comparable to natural background levels.

The physical and chemical analysis of the dredged materials to be used to create the ebb bar show that some samples have slightly elevated concentrations of metals and other contaminants. The U.S. Environmental Protection Agency and U.S. Army Corps of Engineers have reported that sediment testing and analysis for the proposed project is not yet complete and that toxicity and bio-accumulation testing might need to be performed in order to determine the suitability of dredged sediments for nearshore and beach disposal. The final determination has yet to be made. However, the U.S. Fish and Wildlife Service believes that the sediment testing and analysis completed to date, in combination with the Service's commitment to only place suitable, uncontaminated sediments in the nearshore zone to create the ebb bar, is adequate evidence to allow the Commission to find this component of the project consistent with the water quality policies of the CCMP.

The Commission typically reviews all the results from physical, chemical, and bioassay testing of sediments proposed for placement in the nearshore or deep-ocean environment. Once that information is received and analyzed by the Commission, the Commission is then able to make a determination as to whether materials proposed for ocean disposal are in fact suitable for such placement. However, the Service submitted the following language to the Commission on November 9, 2001, that modified the dredge and fill element of the proposed project as follows:

> *We continue to work with the Corps of Engineers, Environmental Protection Agency, and Coastal Commission staff to identify the specific dredge material volumes for use in constructing the ebb shoal. We believe we have demonstrated that it is feasible to determine*

those areas proposed for dredging, that are both sandy enough and clean enough for placement in the ocean nearshore zone and are seeking concurrence of these regulatory agencies. If, by the time of the [November 13, 2001] public hearing on the project, the regulatory agencies have not provided this concurrence, we will modify the proposed Bolsa Chica wetlands restoration project by stating that:

Prior to the start of construction, the Service will submit to the Commission for its review the final sediment dredging and disposal plan for the project (including evidence of plan review and approval by the U.S. Army Corps of Engineers and concurrence by the U.S. EPA);

The final sediment dredging and disposal plan will provide for nearshore (i.e., to create the offshore ebb bar and to nourish adjacent beaches) and/or upland beach disposal of only those dredged materials from the Bolsa Chica Lowlands that are physically and chemically suitable for unconfined aquatic disposal;

As used above, the term "physically suitable" means the greater of either: a) 80% sand by total volume; or b) in the case of upland beach disposal, within 10% of the existing proportion of sand in the material on the receiving beach; and

As used above, the term "chemically suitable" means that the results of chemical analysis demonstrates that: a) the dredged materials are not hazardous waste (as defined by California Health and Safety Code Sections 25117 and 25141); and b) meet the requirements of the "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Inland Testing Manual" (U.S. EPA and Corps of Engineers (February, 1998)), which addresses sediment disposal requirements contained in the federal Clean Water Act Section 404(b)(1) guidelines (40 CFR Part 230).

With this commitment regarding the type of dredged material to be placed in the nearshore zone and on adjacent beaches, the Commission concluded that the proposed project will not adversely affect water quality at or adjacent to the Bolsa Chica Lowlands, and that the project is therefore consistent with the water quality protection policies of the CCMP.

E. ENVIRONMENTALLY SENSITIVE HABITAT. The Coastal Act provides:

Section 30230

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30240

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

The essence of this project is the creation, restoration, and substantial enhancement of important coastal biological resources. The project is designed to increase very significantly the diversity and abundance of important native species in all trophic levels and in numerous habitat types. The project is being funded by the Ports of Los Angeles and Long Beach and is, therefore, also designed to provide those entities with mitigation credits for planned development activities that will result in the fill of deep water habitats. This does not in any way diminish the value of the ecological benefits that result from the project, but is does constrain the proportional representation of the habitat types that will be created and the physical design of some elements of the project. Natural salt marshes tend to have numerous sinuous channels of a mix of sizes (orders), many of which are intertidal, and tend to have a large proportion of the acreage in middle marsh plain. The full tidal portion of this project is designed as a shallow tidal basin with a very large proportion of subtidal and low intertidal mudflat habitats; habitats that are of particular benefit to marine fishes and wading and shore birds. This project also includes large areas of mid to high pickleweed habitat that is physically separated by berms and subject only to muted tidal flows, non-tidal seasonal pond habitat, and least tern nesting islands in non-traditional locations. These are not features that were found in the pristine salt marsh that once occurred at this location.

Attention is brought to this fact because it is a potential source of criticism, and it is reasonable to ask, "Are the unnatural design elements serious flaws in the proposed project?" In general, the Commission thinks the answer must certainly be "No." Today it would not be possible to recreate the historic saltmarsh that once existed at Bolsa Chica. Not only have there been practically irreversible physical changes (e.g., construction of the Pacific Coast Highway, Huntington Harbor, flood control structures, and a residential subdivision), and other draconian but potentially reversible alterations (e.g., dikes and fill of salt marsh for oil infrastructure and conversion of beach habitat to recreational areas), but there have been profound changes in the distribution and abundance of coastal species or populations. For example, California least terns and snowy plovers now occur in perilously low numbers and their natural beach habitats are no longer available. Similarly, Belding's savannah sparrows are much reduced in numbers and in

many places now rely on marginal habitats such as the diked areas of pickleweed at Bolsa Chica that depend on rainfall for moisture. The goal of this restoration, then, is not to mimic some presumed historical landscape, but rather to create and restore as many functioning, interrelated elements of the historical ecosystem as is feasible, while preserving and enhancing some important ecological elements that are already present (e.g., seasonally ponded pickleweed and mudflat). The proposed project accomplishes this goal and is clearly the environmentally least damaging of the various reasonable design alternatives that were considered. Alternative 5, which involves irrigating and managing freshwater and seawater inputs, has few negative impacts, but it also has few ecological benefits and would minimally alter the ghost of a salt marsh ecosystem that currently exists.

The critical factor for saltmarsh restoration in southern California is a strong tidal connection to the sea. Under current conditions at Bolsa Chica the major habitat types consist of 318 acres of upland and saltgrass, 296 acres of non-tidal pickleweed, and 397 acres of perennial and seasonal ponds dependent on freshwater inputs. The proposed project would restore at least 348 acres to full tidal action and 179 acres to a muted tidal regime[1] (Table 4.5-3, EIR)(**Exhibits 19 and 20**). This will result in nearly immediate colonization by the marine invertebrates and algae that provide the basic trophic foundation that will support a diverse assemblage of marine and estuarine fishes, wading and shore birds, and open-water foragers such as terns and pelicans. It is estimated that there will be suitable cordgrass habitat for some 15 pairs of the federally endangered light-footed clapper rail, and that improvements in pickleweed habitat associated with tidal flushing will support an additional 255 pairs of Belding's savannah sparrows. If properly maintained, the constructed tern islands will likely support on the order of 220 California least terns, in addition to significant numbers of elegant, Caspian, and Forester's terns, and nesting habitat for around 68 additional pairs of snowy plovers.

There are additional opportunities for restoration associated with the 252 acres of habitat in the northeast corner of the lowlands that will probably continue to be in oil production for 15 to 20 years. The planned ocean inlet is adequately sized to provide full tidal flushing to this area. The current conceptual plan calls for eventual creation of a modified tidal basin which would be primarily open water and tidal mudflat habitat. The Commission believes consideration should be given to modifying that plan to provide additional acreage at Bolsa Chica of salt marsh habitats that are currently under-represented. In particular, this offers an opportunity to create fully tidal salt marsh broken by sinuous channels of various sizes that will complement the habitats planned for Phase I of this project.

The only negative post-construction biological impacts directly resulting from this habitat restoration project are associated with habitat conversion and periodic maintenance dredging. In general, the existing areas that will be converted to tidal habitats are ruderal uplands, small areas of brackish marsh, and a small area of dune habitat that supports coastal scrub plants and coastal woolly-heads, a rare plant. The impact to coastal woolly-heads may be avoided by constructing berms or mitigated by propagating additional plants in an area where they are naturally more abundant. For dune-dependent insects, the proportion of dune habitat in the region that is being

[1] In the text, the estimated acreages are 366.5 for full tidal and 200 for muted tidal.

converted does not appear significant. The impacts to other vegetation are considered self-mitigating by creating tidal habitat that is more appropriate and valuable in this setting. The loss of upland foraging and roosting habitat for various species of birds will be offset by the creation of higher quality tidal habitats. Some mammals, such as the San Diego black-tailed jackrabbit will lose habitat, whereas others, such as the California salt marsh shrew, will gain habitat. Overall, the impacts do not appear significant and no species are likely to disappear from the Bolsa Chica lowlands as a result of the restoration.

About 150,000 cubic yards of material will be dredged from the tidal inlet every two years in order to maintain adequate tidal flushing of the restored area. This will be timed to avoid the period of grunion spawning. There will be ephemeral increases in water turbidity and the burial of intertidal and shallow subtidal organisms. However, these are also natural periodic phenomena and the organisms that live in habitats that are at risk are adapted to such conditions. Any impacts will be localized and recovery will be rapid.

The acute construction impacts are of greater magnitude. About 1,800,000 cy of material will be dredged as part of the construction of the full tidal basin. This will destroy the existing habitats and the associated organisms. The organisms affected are common and do not include sensitive species. This is an insignificant impact that is more than adequately mitigated by the creation of more valuable habitat that will promote a much greater diversity and abundance of organisms. Some material will be placed offshore into the ebb bar. This will have effects similar to those of maintenance dredging and will be similarly insignificant for the same reasons. A portion of beach will also be lost due to construction of jetties. The disturbed area of intertidal beach will recover quickly and the lost beach will be replaced by hard substrate that will soon develop a rocky intertidal biota.

There will also be impacts to existing habitats during staging and construction. One to one replacement of any disturbed vegetation is proposed. The vegetation that will be disturbed is primarily pickleweed and saltgrass. This is similar to the situation at San Dieguito in San Diego County where the Commission required 1:1 mitigation for seasonal salt marsh that is disturbed or converted to other tidal wetland habitat during the course of restoration.

There will be several temporary impacts to bird populations. The most significant is the loss of about 60% of the existing 213 Belding's savannah sparrow territories during construction. This will be mitigated by improving undisturbed pickleweed habit through water management. Higher quality habitat supports more birds per unit area because territories are smaller. Within five years of the completion of the restoration, the pickleweed in tidal areas is expected to provide a substantial net gain in occupied territories.

To address Commission concerns voiced at the August 9, 2001, public hearing, the Service submitted an additional analysis of the Belding's savannah sparrow issue and is provided in **Exhibit 21**. That analysis states that:

> *[O]ur belief is that Belding's savannah sparrow nesting density is largely related to the vigor and productivity of the pickleweed, and associated community of organisms found in*

tidal, muted tidal, or salty wetter areas. Therefore, to assure no harm to the species, we would be making interim improvements to suboptimal nesting habitat outside the tidal basin construction area to increase the likelihood of any displaced pairs finding suitable nesting habitat. We intend to conduct interim water management in muted tidal areas during the several years of construction of the tidal basin. Because muted tidal influence in the proposed muted tidal area can be achieved only following completion of the inlet and full tidal basin, this interim water management will likely entail pumping of surface water into or out of some part of the muted tidal area. As construction lead, we would make such interim water management decisions, but the action would be carried out by the construction contractor. Consequently, better definition on the actual measures and timing of the action shall wait until final design is completed, the construction schedule is more clearly defined, and the bid specifications are prepared.

There may also be a loss of 10 to 21 of the existing snowy plover nesting sites (out of a total of 30, on average) during construction. To minimize impacts, replacement nesting sites will be constructed prior to excavation and a 100-ft buffer around active nests will be maintained. After restoration, there will be a large net gain in plover nesting habitat and in the number of nesting pairs expected. The Final EIR/EIS states that:

Replacement nesting sites for western snowy plovers would be constructed prior to excavation of nesting areas in the full tidal basin. Active nest sites would be flagged or fenced . . . Biological monitors would be present during the nesting season to make sure that all construction activities maintain a 100-foot buffer around active nest sites.

The Service completed a Biological Opinion pursuant to Section 7 of the Endangered Species Act to address all the issues of the federally listed and Threatened western snowy plover. The relevant sections of the Biological Opinion are provided in **Exhibit 22**. That document concludes that:

After reviewing the current status of the western snowy plover, the environmental baseline for the action area, the effects of the proposed Bolsa Chica Lowlands Restoration Project, and the cumulative effects, it is the Service's biological opinion that the construction, as proposed, is not likely to jeopardize the continued existence of the western snowy plover.

The project will entail short-term losses of upland and non-tidal wetland habitat for waterfowl, wading birds, shorebirds, and upland birds. However, substantial areas of similar habitat will remain during construction (e.g., the future full tidal area, the muted tidal basin, and in the area of seasonal ponds), so temporary impacts will be minimal. The long term impact of the restoration on these species will be beneficial.

Construction activities will also disturb and displace some mammals during excavation of the full tidal basin. The temporary loss of habitat for the California salt marsh shrew will be more than compensated by the net gain in salt marsh habitat as a result of the restoration. Local populations of some upland species may be smaller following the restoration, but none are expected to disappear from the Bolsa Chica lowlands.

The goal of this restoration project is to restore estuarine and salt marsh habitats within the footprint of the historical area of tidal wetlands. Without question, the overall effect will be beneficial, increasing the health, abundance and diversity of habitats and their constituent species. However, it is reasonable to question whether these benefits will be long lasting in the face of the probable rise in sea level over the next many decades. The initial effect of rising sea level will be to increase the amount of open water habitat, shift intertidal habitat landward, and reduce the amount of upland habitat. However, since the site is constrained by topography and urban development, the ultimate effect will be to lose upland and convert some intertidal habitat to open water. This will change the way in which the ecosystem functions and will benefit some groups of species over others. However, the overall effect will still be a very considerable enhancement of natural resources within the region.

The Commission finds, nevertheless, that any project which proposes to restore and enhance biological resources (especially one for which mitigation credits are received) must include a monitoring program. The Commission's experience with coastal wetland restoration indicates that such efforts cannot be assumed to be successful in advance. An effective monitoring program, with requirements for habitat evaluation, maintenance, and remediation, can help to ensure that the restoration project achieves succes and stability.

On November 9, 2001, the Service submitted to the Commission the "Bolsa Chica Lowland Restoration Plan Biological Monitoring and Followup Plan" **(Exhibit 23)**. The plan provides:

> *The purpose of the Bolsa Chica wetlands long-term ecological monitoring program is to document the habitat improvements for fish and wildlife, the succes of revegetation efforts, and the use of the site by endangered species. In addition, there are several specific monitoring programs to insure that the restoration is built according to the approved plans, the inlet is properly maintained, that constructed nesting areas have adequate maintenance, that any impacts to sensitive plant species are offset, and that construction impacts to Belding's savannah sparrow are minimized.*
>
> *The ecological monitoring objectives are:*
>
> - *Facilitate evaluation of the effectiveness of the restoration to provide habitat for fish and wildlife;*
> - *Document changes in the ecology of the wetlands environment over time;*
> - *Provide timely identification of any problems with the physical or biological development of the restored area;*
> - *Assist in providing a technical basis for resource management of the restored wetland by documenting maintenance needs and enhancement opportunities.*

The program will emphasize monitoring the biological elemnts of the lagoon. Some physical elements will be monitored to provide supporting information for the biological assessments. Sampling programs are designed to document the condition of vegetation, benthos, fish, birds, and special status species as well as the state of the physical environment on which they depend.

Biological monitoring will be conducted during the 2nd, 5th, and 10th years after completion of construction. Listed species will be monitored each year. Biological sampling will be conducted at fixed intervals as specified in this program. The reasons for the various sampling frequencies are explained in the discussions of individual program elements.

Sampling along permanent transects established at strategic locations will support mulitple monitoring elements. To the extent possible, physical and biological variables will be measured at the same general location in order to suggest causal relationships among the variables. The information will be summarized in an annual report prepared by the responsible agency for the regulatory agencies (COE and CCC), as well as the other proponent agencies (NMFS, CDFG, SLC, Coastal Conservancy, USFWS, and EPA).

This monitoring program was prepared in consultation with state and federal regulatory agencies responsible for maintaining, protecting, and enhancing natural resources (CDFG, NMFS, and USFWS). The program is consistent with agency guidelines for environmental monitoring.

In conclusion, the proposed wetlands restoration plan will restore estuarine and salt marsh habitats within the footprint of the historical area of tidal wetlands at the Bolsa Chica Lowlands. The overall effect of the project will be beneficial and will significantly increase the health, abundance, and diversity of weland habitats and their constituent species in the Lowlands. In addition, the project includes a detailed, long-term biological monitoring and maintenance program. Therefore, the Commission finds that the proposed project is consistent with the wetland and environmentally sensitive habitat policies of the CCMP.

F. DEVELOPMENT. The Coastal Act provides:

Section 30254

New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route l in rural areas of the coastal zone remain a scenic two-lane road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.

Section 30251

The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

In addition, the applicable Coastal Act water quality policies are cited on page 41 of this report.

The proposed wetland restoration project includes a new Pacific Coast Highway (PCH) bridge over the the tidal inlet. The Final EIR/EIS describes this project component:

PCH would cross the entrance channel on a new bridge with a low deck elevation because the inlet is to be non-navigable. The elevation of the bridge would be high enough to avoid wave damage. The elevation of PCH would be raised at the approach to the bridge, further reducing the current flooding threat along this section of PCH. A bridge and approaches over the tidal inlet would be constructed to the proposed ultimate six-lane configurations within the immediate area of the bridge and transition to the existing four-lane configuration north and south of the structure. The construction of six lanes across the bridge is a Caltrans requirement. The bridge would be protected from scour with quarry rock. The total length of the bridge would be 420 feet. The bridge would support 6 traffic lanes, 2 bicycle lanes, a 6-foot center median, and one 19-foot 6-inch emergency vehicle/beach traffic lane [a lane on the west edge of the bridge (separated from southbound PCH vehicle traffic by a concrete barrier) for pedestrians, bicyclists, and State Beach emergency vehicles].

Under the 4-lane striping plan outlined in the Final EIR/EIS, the bridge would contain (from west to east) a concrete barrier, the 19.5-foot State Beach access lane, a concrete barrier, an 8-foot paved shoulder, two 12-foot southbound traffic lanes, a 12-foot paved median, two 12-foot northbound traffic lanes, an 8-foot paved shoulder, an 18-foot-wide paved area reserved for future re-striping of the bridge to 6 lanes, and a concrete barrier.

Regarding the need for a 6-lane bridge, in its October 16, 2001, letter to the Commission, the U.S. Fish and Wildlife Service stated that:

According to Caltrans District 12, they would not approve the design or accept ownership of the Pacific Coast Highway (PCH) bridge unless it is consistent with the County Master Plan of Highways, which continues to indicate that PCH should ultimately have 6 traffic lanes. However, we are aware of no current needs, plans, or intentions to widen PCH from its current 4 lanes between Seapoint and Warner. The current bridge design would not

encroach on wetlands and there is only about a 0.25-acre footprint on the State Beach property which would be devoted to bikepath/safety road access and egress lane from the park, both of which are currently on the State Beach property. We do not believe that construction of a bridge wide enough for 6 lanes would encourage or facilitate widening of PCH along the entire section. ***On the other hand, if allowed by Caltrans and/or the County plan, we would construct a bridge wide enough to accommodate only 4 traffic lanes*** *(emphasis added).*

The road bed must be elevated over its existing grade in order to cross over the inlet. This would solve a PCH drainage problem for this section. Also, the new panoramic view offered by this raised road section would not be blocked by an obstructive bridge railing.

At the August 9, 2001, public hearing on this consistency determination, the Commission expressed concern about the need to construct a bridge sized for six lanes of vehicle traffic, given that PCH currently is a 4-lane highway throughout the Bolsa Chica Lowlands. Given the information available at that time, the Commission believed that a bridge sized for six lanes might not be consistent with Section 30254 of the Coastal Act, which states in part that:

New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division . . . .

However, in a letter received at the November 13, 2001, Commission meeting from Caltrans District 12 headquarters, Caltrans stated that:

The California Department of Transportation supports the State Lands Commission Project to restore the Bolsa Chica Wetlands in Orange County. This project will require that an ocean inlet be constructed through Pacific Coast Highway (SR-1) to allow tidal action to the inland areas.

This letter confirms the Department's position to allow the construction of a four-lane bridge on SR-1 over the proposed inlet. The Department looks forward to working with the Bolsa Chica Steering Committee and will provide timely design and construction oversight on this important project.

As a result, the Service modified the proposed project with the following language submitted to the Commission at the November 13, 2001, Commission meeting:

According to Caltrans District 12, they will now accept a 4-lane bridge design for the Pacific Coast Highway (PCH) crossing over the proposed inlet. We are revising the Project Report for them, accordingly. The USFWS hereby modifies the proposed Bolsa Chica wetlands restoration project by confirming that the Pacific Coast Highway bridge will: (1) be redesigned to provide pavement for only four lanes of PCH vehicle traffic; (2) retain the proposed pedestrian/bicycle/service vehicle lane on the western side of the bridge; (3) incorporate bridge rails that have been crash-tested and approved for use in California (such as the "Alaska rail") similar to those recently approved by the Commission for use on

the Marina Drive Bridge over the San Gabriel River (CDP 5-00-321); and (4) incorporate water quality protection measures (to mitigate stormwater and urban runoff from the bridge) similar to those approved by the Commission in 5-00-321.

In conclusion, with the bridge now modified to include only four lanes of PCH vehicle traffic, bridge rails that will not adversely affect views from PCH, and water quality control measures, the Commission finds that the proposed 4-lane bridge is consistent with the public works, visual resource, and water quality policies of the CCMP.

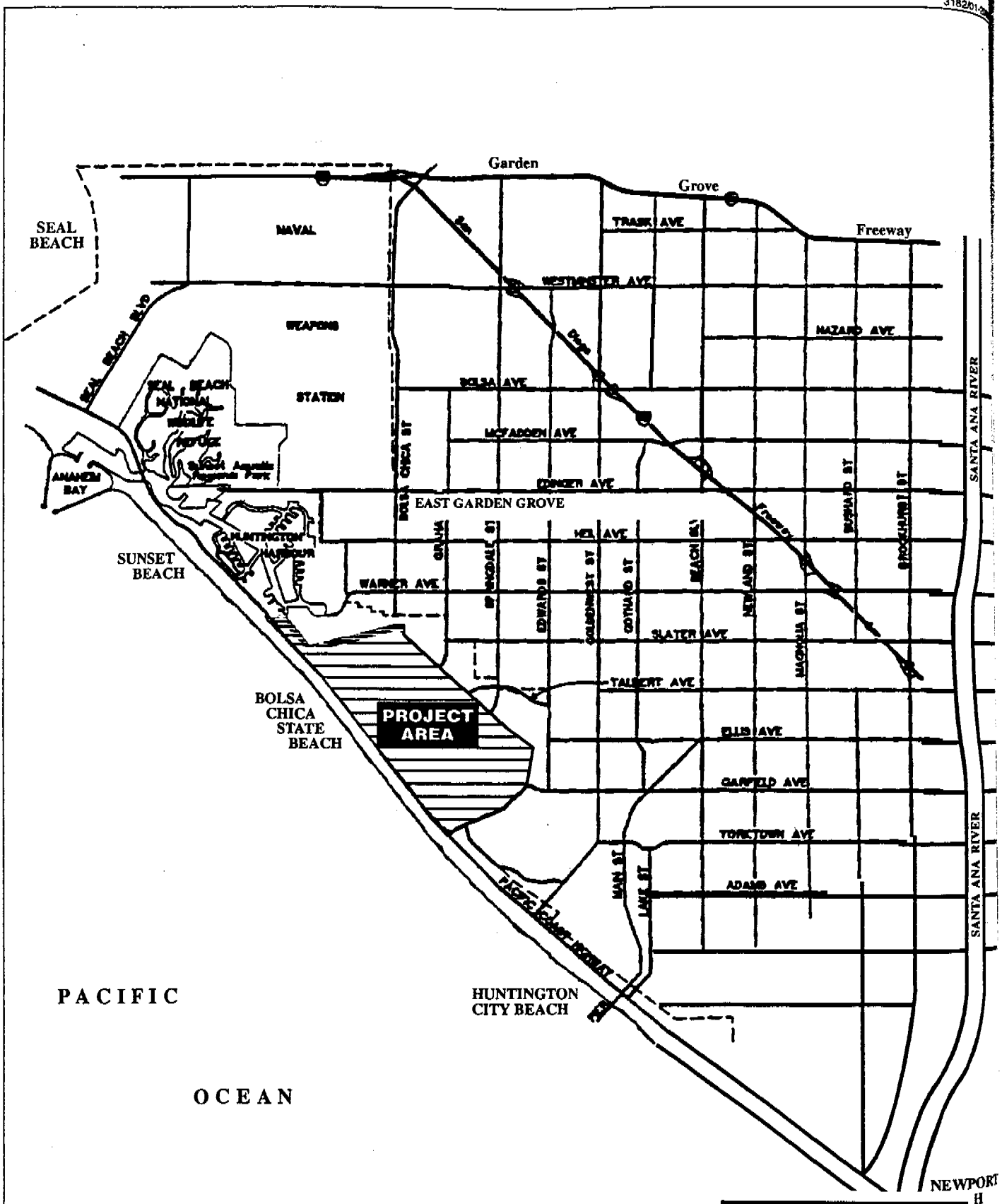

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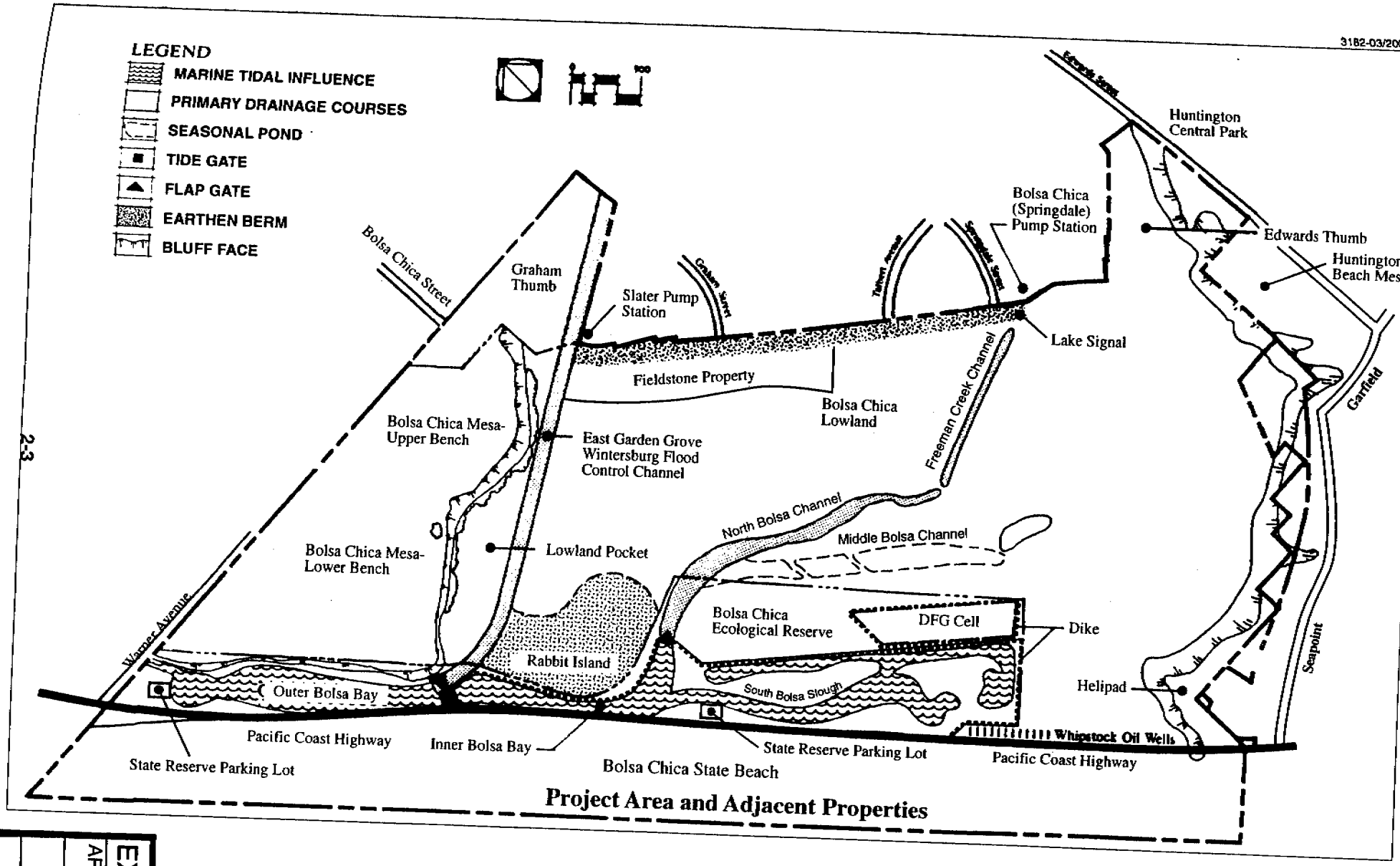
EXHIBIT NO. 1
APPLICATION NO.
CD-61-01
California Coastal Commission



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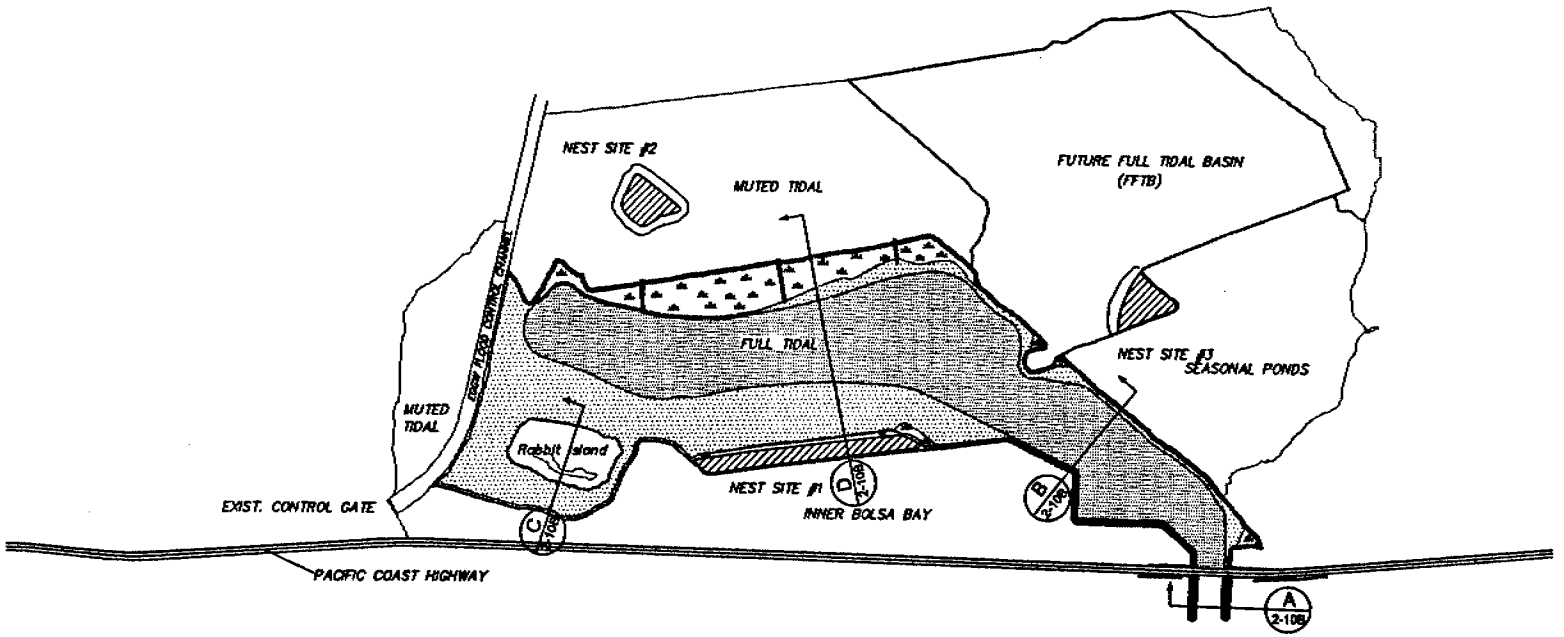
Source: County of Orange, 1993

BOLSA CHICA EXISTING PHYSICAL FEATURES AND PLACE NAMES
Figure 2-2



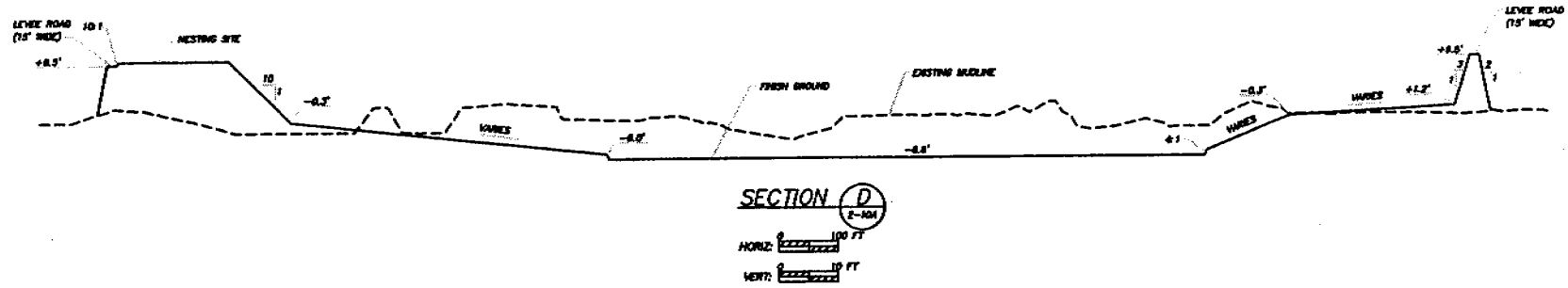
LEGEND

Elev. Range in Feet MSL		Area (AC)	Percent
−6.8	−6.0	175.5	47.8
−6.0	−0.3	122.6	33.5
−0.3	+2.7	49.5	13.5
higher than	+2.7	18.9	5.2
	TOTAL:	366.5	100.0

0 2000'

PROPOSED PROJECT
CONCEPT PLAN WITHOUT FLOOD DIVERSION
Figure 2-4A

SOURCE: MOFFATT & NICHOL ENGINEERS



SECTION D 2-104

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SECTION C 2-104

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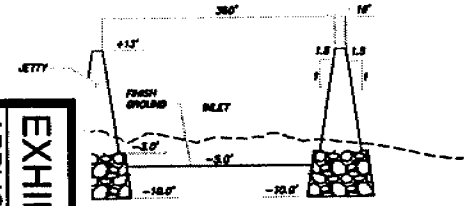

SECTION A 2-104

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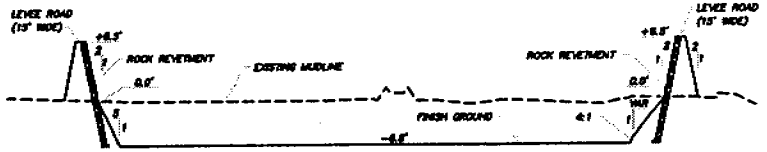

SECTION B 2-104

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PROPOSED PROJECT CONCEPT PLAN WITHOUT FLOOD DIVERSION

2-10

EXHIBIT NO.

APPLICATION NO.

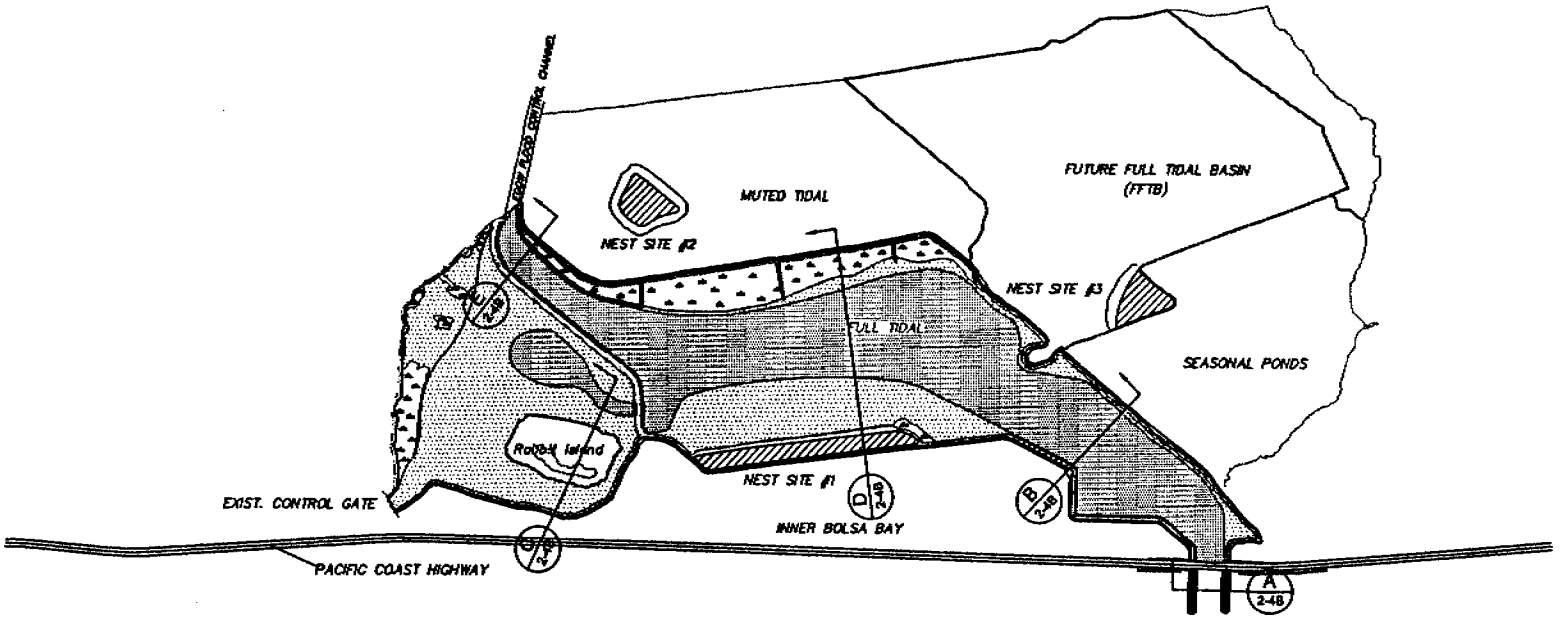
CD-61-01

California Coastal Commission

Table ES-4
Proposed Project Summary

Project Description	➢ Would create approximately 366.5 acres of habitat receiving a full tidal range through an ocean inlet near Huntington Mesa. ➢ Would buy out and abandon oil wells located on a portion of the acquired property and on the adjacent State Ecological Reserve. ➢ Would dredge approximately 2.7 million cy to create a basin. ➢ Would construct a berm around the basin except where adjacent to the flood control channel levee. ➢ Would construct a new ocean inlet that would be approximately 360 feet wide between the crest of the jetties. ➢ Would construct a bridge for PCH over the inlet channel. ➢ Would include 200 acres of muted tidal. ➢ Would include a 252-acre future full tidal area. ➢ Would construct a French drain between the wetlands and housing development. ➢ 120 acres in southeastern corner of the Lowlands would be left unchanged as seasonal ponds. ➢ Construction would take approximately 3 years.
Predicted Benefits	➢ Increased quality and quantity of open water and intertidal mudflat habitats would provide overwintering habitat for migratory shorebirds, seabirds, and waterfowl. ➢ A healthy and diverse aquatic community of marine and estuarine invertebrates and fishes would become established in the full and muted tidal basins. ➢ The full tidal basin would provide nursery habitat for the California halibut. ➢ Nesting habitat for the state- and federal-listed endangered California least tern and the federal-listed threatened western snowy plover would be increased. Additionally, these areas would provide nesting habitat for a variety of other water-associated birds. ➢ Cordgrass habitat would expand and is expected to support nesting by the state- and federal-listed endangered light-footed clapper rail. ➢ Pickleweed saltmarsh habitat would be enhanced. ➢ Nesting territory for the state-listed endangered Belding's savannah sparrow would expand. ➢ Increased quality of saltmarsh vegetation may improve habitat value for the salt marsh shrew. ➢ A diverse wetlands ecosystem would result from the preservation of nontidal habitats including seasonal ponds/sand flats and perennial brackish ponds. ➢ Upgrades to the Lowlands would indirectly benefit surrounding land uses by providing improved public passive use and visual enhancement. ➢ New and enhanced public access opportunities would result. ➢ The tidal inlet would enhance opportunities for recreational fishing. ➢ Addition of construction jobs and increases in visitors to the area could benefit the local economy. ➢ The tidal influence would reduce the potential for mosquito problems.
Potentially Significant Construction Impacts	➢ Potentially significant (Class I) impact to water quality from discharge of sediments in the nearshore zone to prefill the ebb bar to equilibrium. ➢ Potentially significant (Class I) impacts to state endangered Belding's savannah sparrow from temporary loss of breeding territories during construction. ➢ Potentially significant (Class II) impact from loss of a portion of the Bolsa Chica State Beach parking area and beach area used during construction for staging and ocean inlet construction. ➢ Potentially significant (Class II) impact from temporary loss of restroom facilities near staging/inlet construction area. ➢ Potentially significant, adverse (Class I) impact from loss of beach use at the location of the PCH bridge and ocean inlet during holidays and weekends

	➢ Inlet construction would result in loss of surfing use at Lots 14 and 15 and could further constrain heavily used surfing area at Lots 23 and 24, a significant, adverse (Class I) impact. ➢ PCH bridge and ocean inlet construction would result in a temporary degradation to the character of the site, alter the existing viewshed, and change viewers expectation of the beach, a Class I significant, adverse impact. ➢ Conflicts between construction traffic and local resident traffic on Seapoint Avenue would result in a potentially significant (Class II) traffic impact. ➢ Conflicting construction vehicle turning movements at the PCH staging area would result in a potentially significant (Class II) traffic impact. ➢ Construction may result in the exceedances of daily and quarterly NO_X limitations, producing a potentially significant (Class I) impact. ➢ Construction may result in exceedances of daily and quarterly PM_{10} limitations, resulting in a significant (Class II) impact. ➢ Traffic noise from haul trucks may cause significant, adverse (Class II) impacts to local residences along local access roads immediately adjacent to the site.
Potentially Significant Post-Construction Impacts	➢ Potentially significant impact (Class I) because construction of an ocean inlet could expose the wetlands to oil in the event of an offshore oil spill. ➢ Potentially significant (Class II) impacts to residences from changes in groundwater flow. ➢ Potentially significant (Class II) impacts to grunion from placing sand on the beach during maintenance dredging of the tidal inlet. ➢ Potentially significant impacts (Class II) to coastal woolly-heads from introducing tidal flow to the edges of Rabbit Island. ➢ Jetties in the surf zone near the ocean inlet could result in a potentially significant (Class II) safety impact to surfers and swimmers. ➢ If maintenance dredging were performed 24 hours per day, Class II noise impacts to local residents would result.



LEGEND

Elev. Range in Feet MSL		Area (AC)	Percent
-6.8	-6.0	183.5	44.1
-6.0	-0.3	150.8	36.2
-0.3	+2.7	47.5	11.4
higher than	+2.7	34.5	8.3
	TOTAL:	416.3	100.0

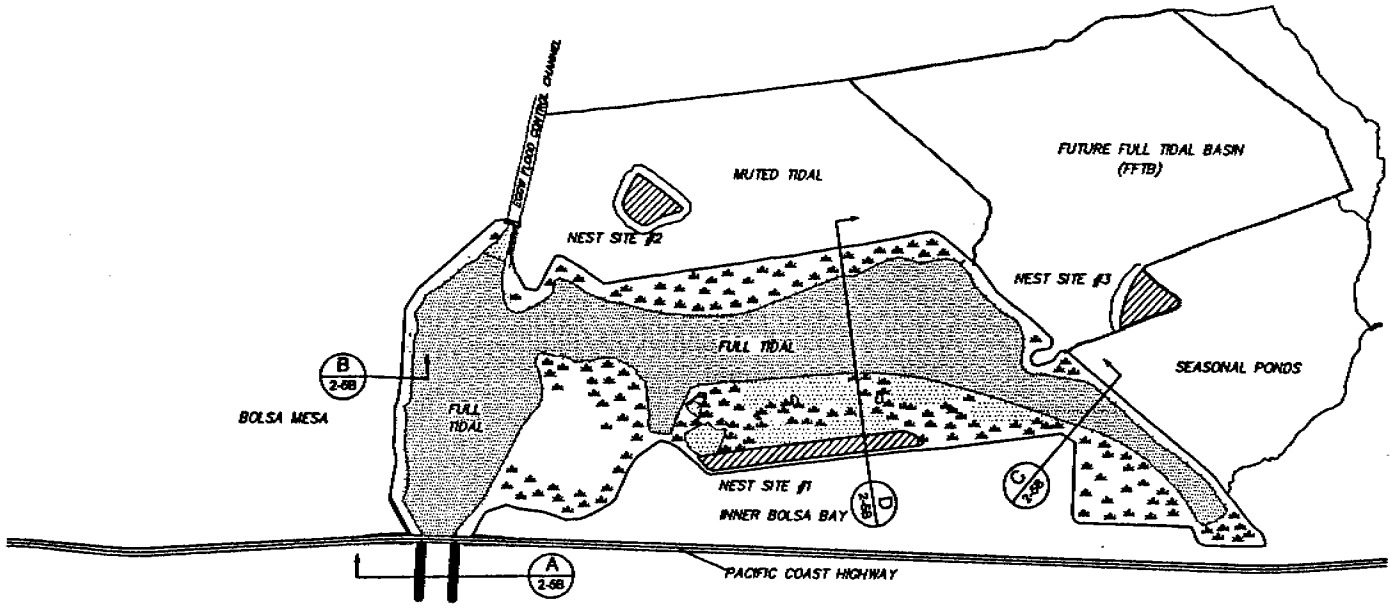
PLAN SCALE: 1" = 2000'

ALTERNATIVE 1

ALTERNATIVE 1
PROJECT PLAN WITH ENTIRE CLOSED SYSTEM

2-20

EXHIBIT NO. 6
APPLICATION NO.
CD-61-01
California Coastal Commission



PLAN SCALE: 1" = 2000'

LEGEND

Elev. Range in Feet MSL		Area(AC)	Percent
−6.8	−6.0	217.2	52.7
−6.0	−0.3	46.1	11.2
−0.3	+2.7	117.6	28.6
higher than	+2.7	31.0	7.5
	TOTAL:	411.9	100.0

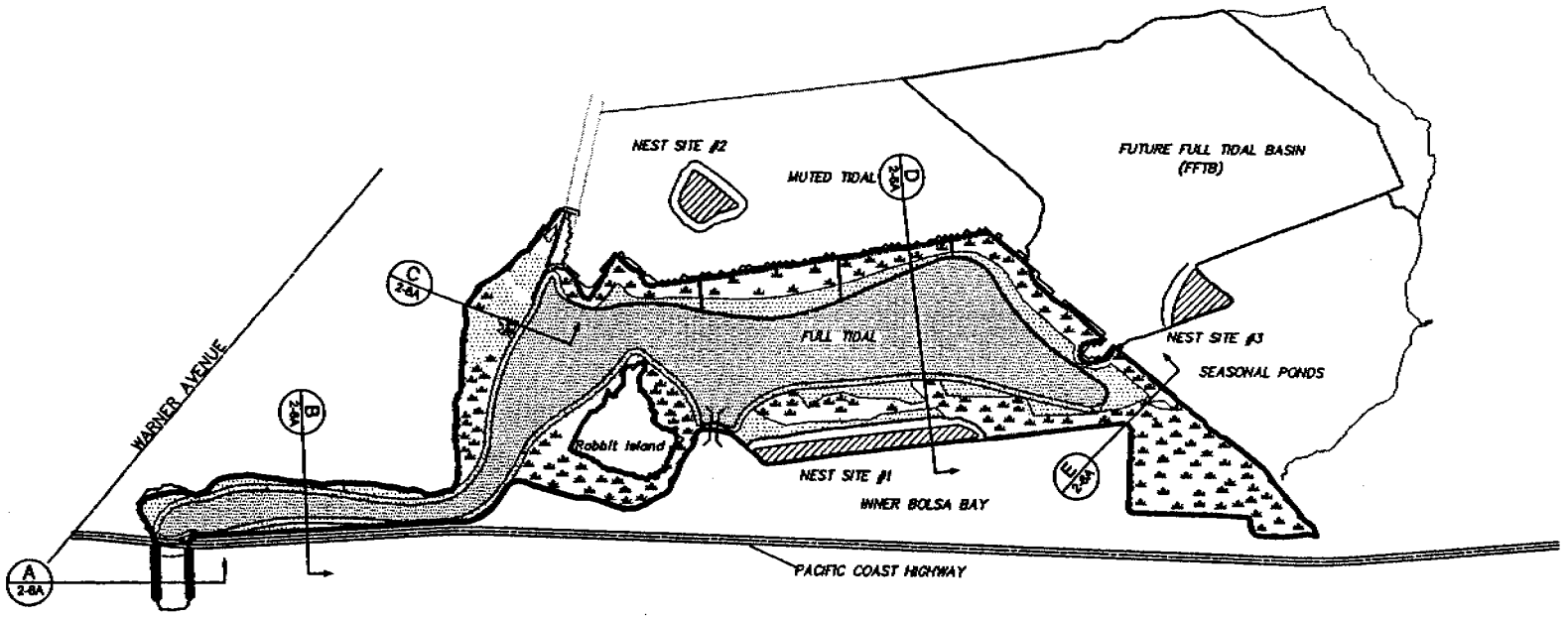
ALTERNATIVE 2
TIDAL INLET NEAR RABBIT ISLAND
Figure 2-7A

SOURCE: MOFFATT & NICHOL ENGINEERS

mbers Group

2-23

EXHIBIT NO. 7
APPLICATION NO. 5-01-61
California Coastal Commission



LEGEND

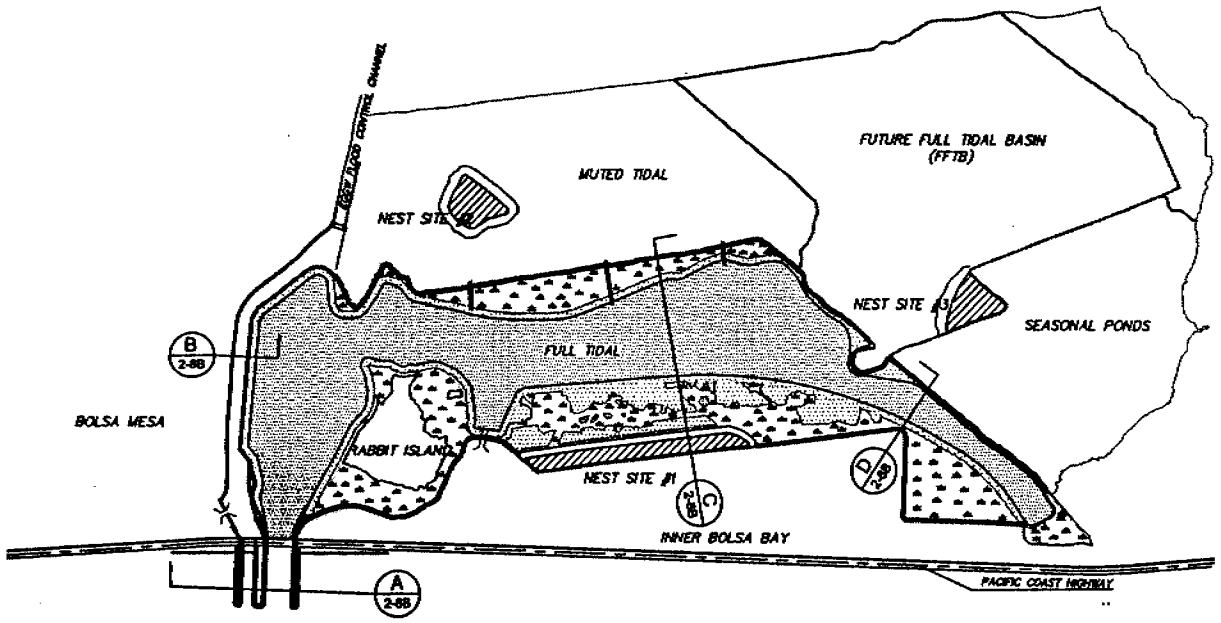
Elev. Range in Feet MSL		Area(AC)	Percent
lower than	-6.0	176.6	39.3
-6.0	-0.3	101.1	22.5
-0.3	+2.7	133.5	29.7
higher than	+2.7	38.0	8.5
	TOTAL:	449.2	100.0

PLAN SCALE: 1" = 2000'

ALTERNATIVE 3
TIDAL INLET NEAR WARNER AVENUE

2-26

EXHIBIT NO. 8
APPLICATION NO.
5D-6-01



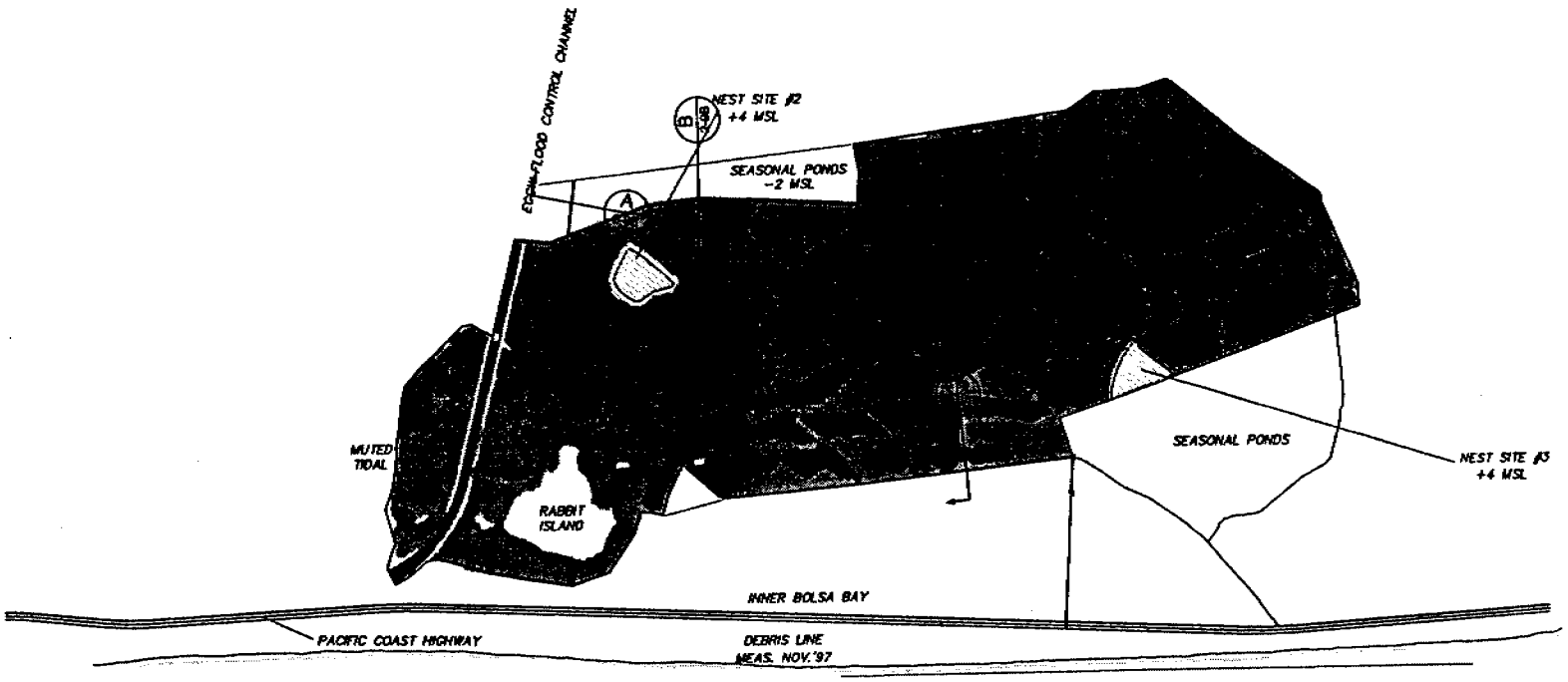
PLAN SCALE: 1" = 2000'

LEGEND

Elev. Range in Feet MSL		Area(AC)	Percent
-6.8	-6.0	194.8	49.2
-6.0	-0.3	61.9	15.6
-0.3	+2.7	92.5	23.4
higher than	+2.7	46.7	11.8
	TOTAL:	395.9	100.0

ALTERNATIVE 4
THREE JETTY

EXHIBIT NO.
APPLICATION NO.
CD-61-01



LEGEND

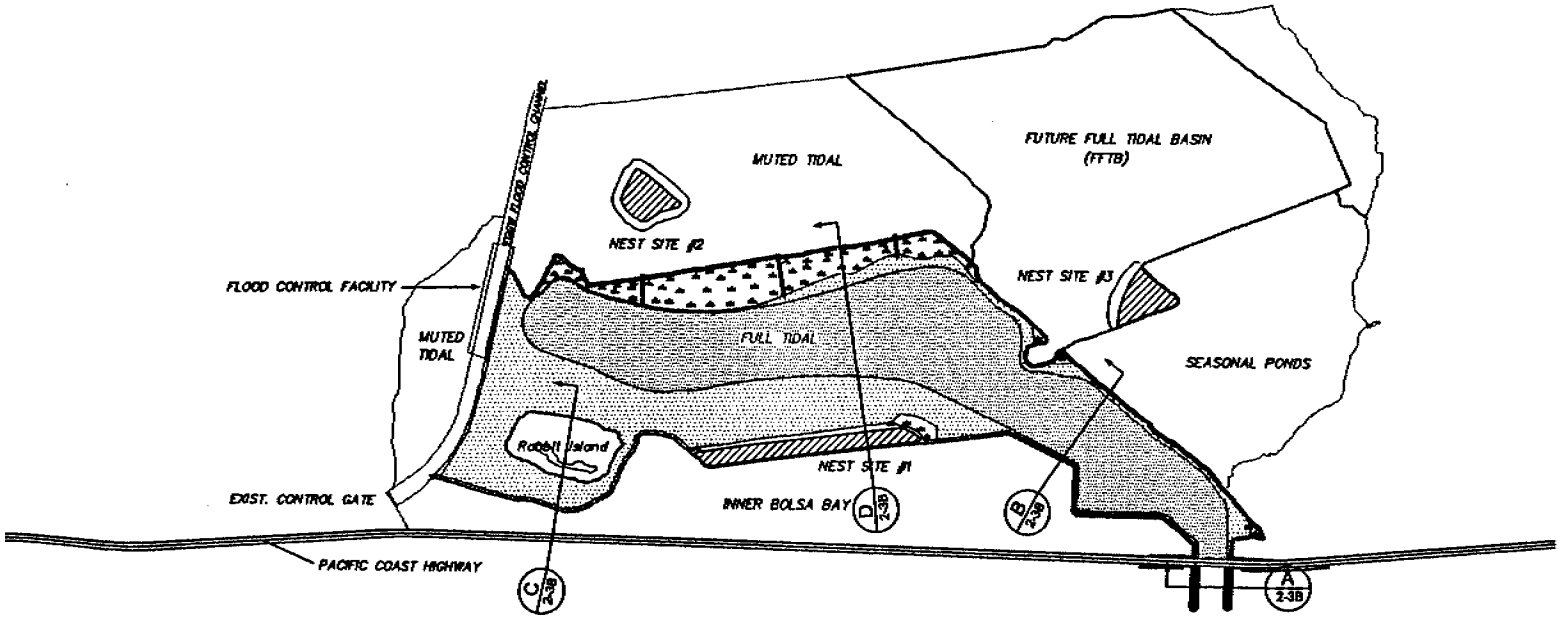
	Elev. Range in Feet MSL		Area (AC)	Percent
■	−6.0	−0.3	327.9	42.5
■	−0.3	+2.7	398.0	51.5
□	higher than	+2.7	46.3	6.0
		TOTAL:	772.2	100.0

PLAN SCALE: 1" = 2000'

ALTERNATIVE 5 – IRRIGATION/WATER MANAGEMENT

Figure 2-10A

SOURCE: MOFFATT & NICHOL ENGINEERS



LEGEND

Elev. Range in Feet MSL		Area (AC)	Percent
−6.8	−6.0	175.5	47.8
−6.0	−0.3	122.6	33.5
−0.3	+2.7	49.5	13.5
higher than	+2.7	18.9	5.2
	TOTAL:	366.5	100.0

PLAN SCALE: 1" = 2000'

ALTERNATIVE 6
CONCEPT PLAN WITH PEAK FLOOD DIVERSION
Figure 2-11A

mbers Group

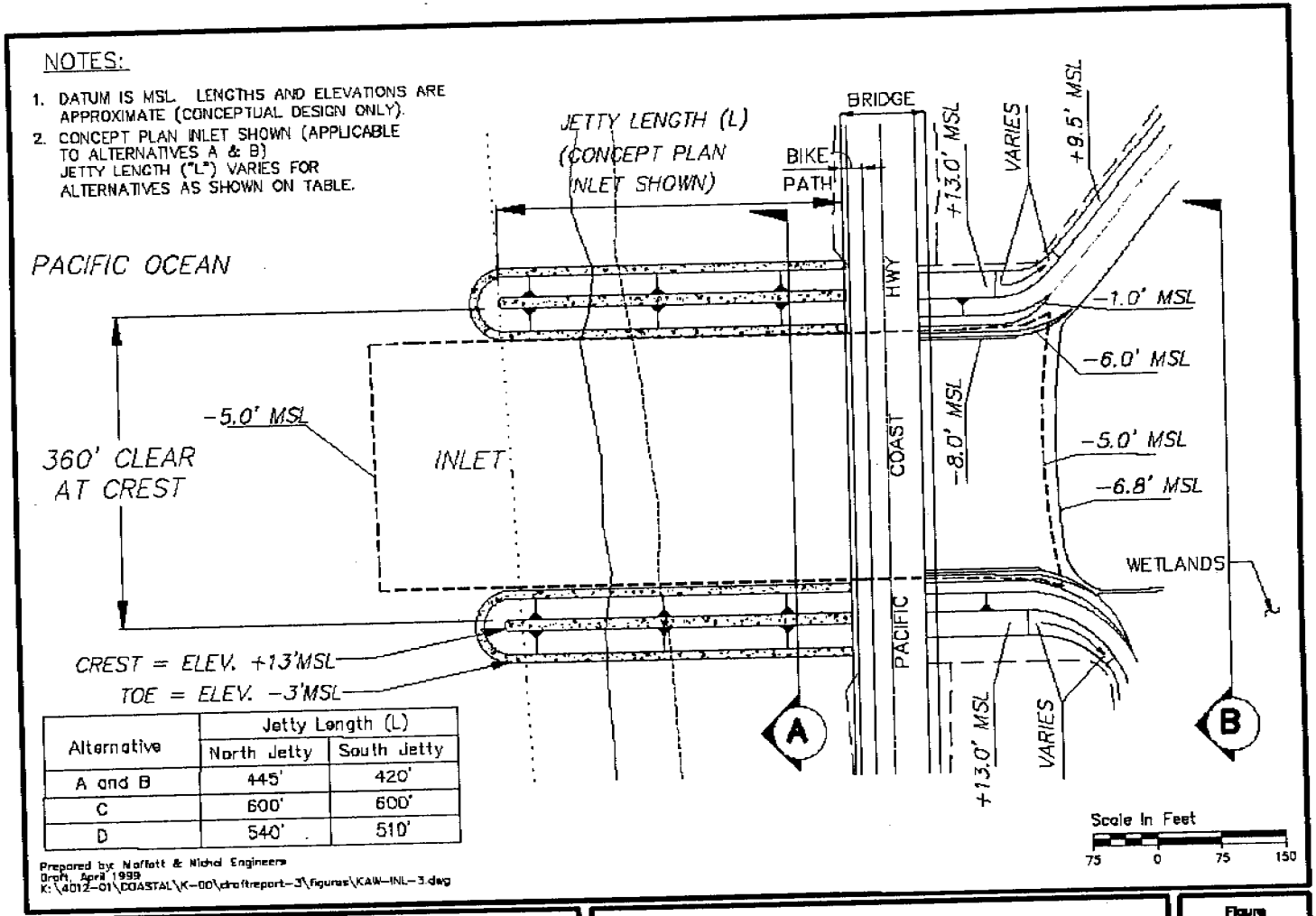
SOURCE: MOFFATT & NICHOL ENGINEERS

2-35

EXHIBIT NO. 4
APPLICATION NO. CD-61-01
California Coastal Commission

NOTES:

1. DATUM IS MSL. LENGTHS AND ELEVATIONS ARE APPROXIMATE (CONCEPTUAL DESIGN ONLY).
2. CONCEPT PLAN INLET SHOWN (APPLICABLE TO ALTERNATIVES A & B) JETTY LENGTH ("L") VARIES FOR ALTERNATIVES AS SHOWN ON TABLE.



Alternative	Jetty Length (L)	
	North Jetty	South Jetty
A and B	445'	420'
C	600'	600'
D	540'	510'

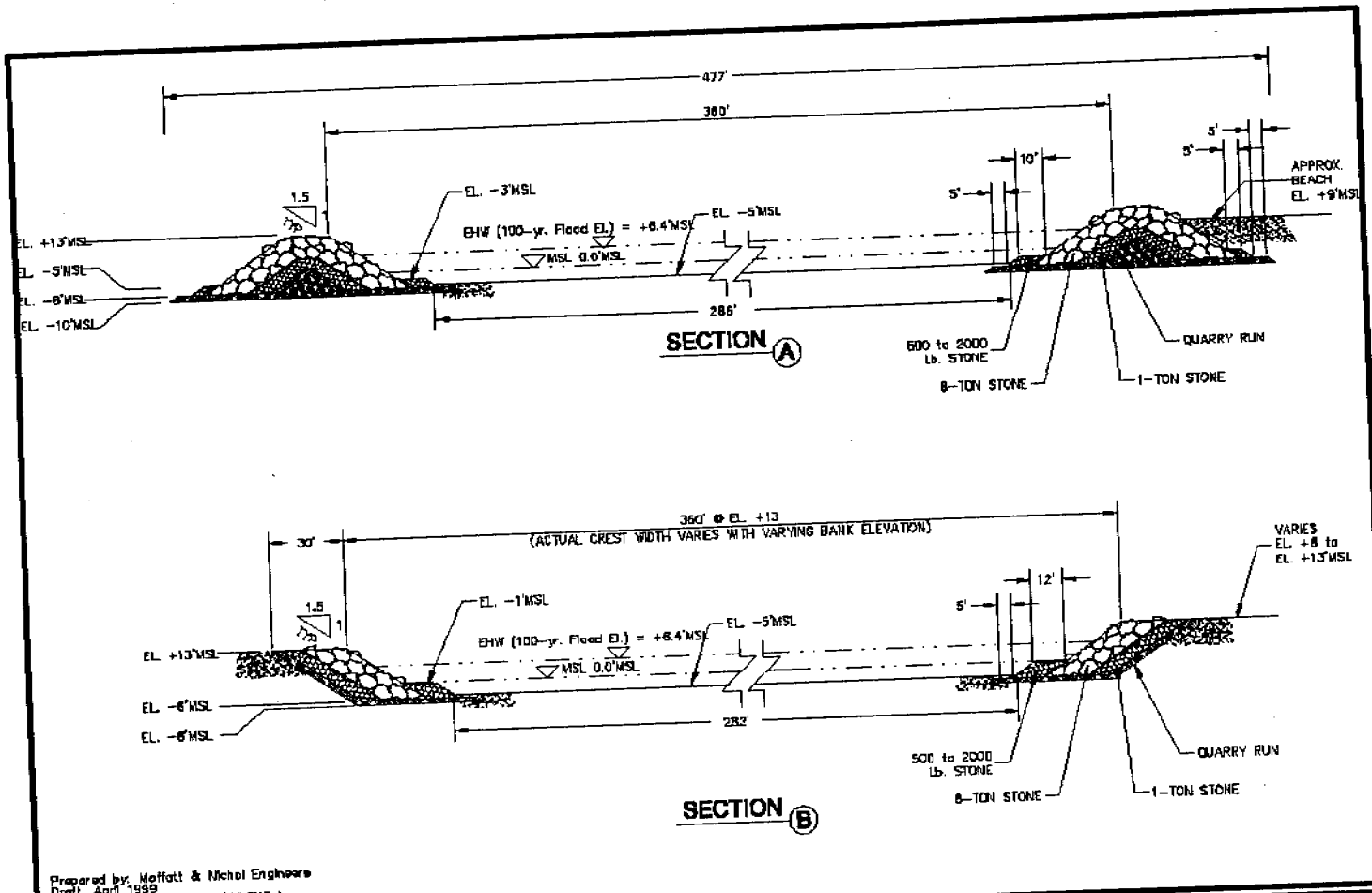
Prepared by: Moffatt & Nichol Engineers
Draft, April 1999
K:\4012-01\COASTAL\K-00\draftreport-3\figures\KAM-INL-3.dwg

Bolsa Chica Preliminary Engineering Studies

Concept Plan Tidal Inlet

Figure 8-50

EXHIBIT NO. 12
APPLICATION NO.
5-01-61-01
California Coastal Commission



Prepared by: Moffatt & Nichol Engineers
Draft: April 1999
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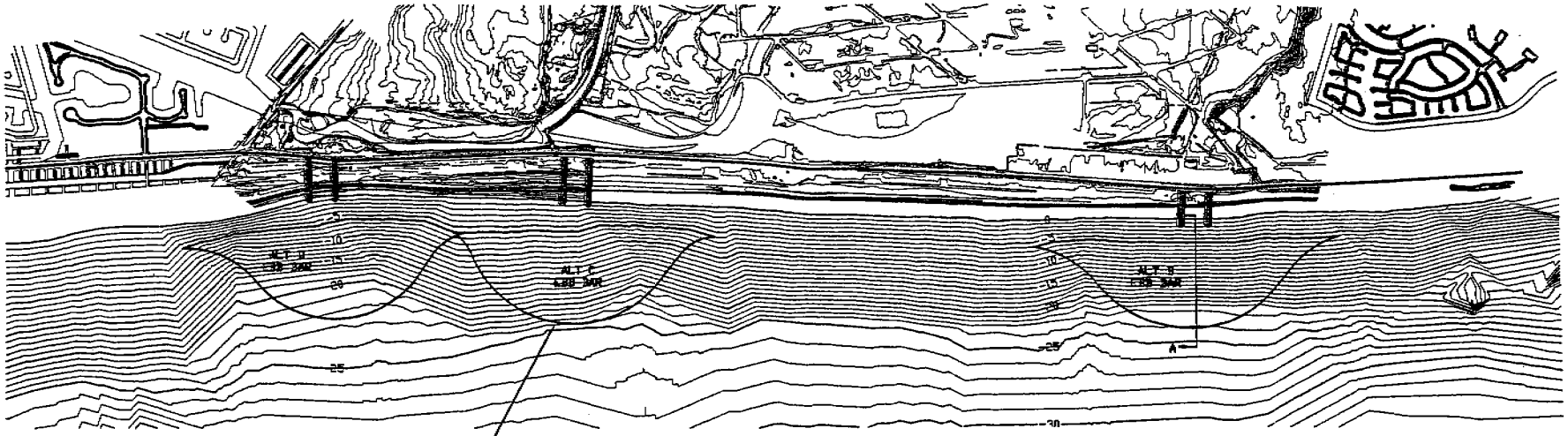
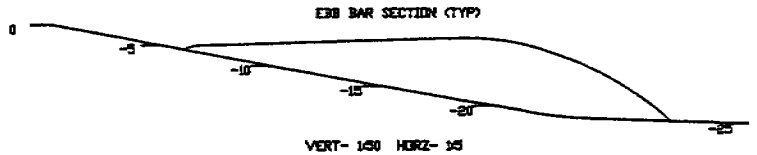
Bolsa Chica Preliminary Engineering Studies	Typical Sections of Concept Plan Tidal Inlet	Figure 4-2



	AREA (FT²)	VOLUME (CY)
ALT B	3,013,000	1,275,000
ALT C	3,117,000	1,271,000
ALT D	3,068,000	1,253,000



SECTION A THROUGH EBB BAR

Scale 1"=1500'

750 0 750 1500

MOFFATT & NICHOL
ENGINEERS
LONG BEACH, CALIFORNIA

:hica Preliminary Engineering Studies

Approximate Footprints of Ebb Bars At Each Inlet

Figure 6-23

:wg\ebb bar.dwg

EXHIBIT NO. 14
APPLICATION NO.
CD-61-01
California Coastal Commission

SIMON

Bolsa Chica Lowlands Restoration Project

Beach Monitoring Plan

9 November 2001

Introduction

A component of the Bolsa Chica Lowlands Restoration Project is to construct a 366.5-acre tidal basin with a possible future restoration extending tidal influence to an additional 252 acres. To restore the most valued habitat, a new ocean inlet must be constructed. This proposed ocean inlet will be located near the southern boundary of Bolsa Chica State Beach and will be about 350 feet wide between stabilizing jetties. The jetties are anticipated to be of rubble-mound construction, extend from the tidal basin, under Pacific Coast Highway (PCH) and onto the beach terminating at the approximately current Mean Lower Low Water beach elevation. The creation of the new inlet and tidal basin will affect nearshore littoral processes; specifically, alongshore currents will be influenced by the tidal flow and the resulting sediment transport causing the formation of both ebb and flood shoals. Of particular concern are the impacts of this morphological change to adjacent beaches and the regional sediment resource. The EIR/EIS for the Bolsa Chica Restoration Project (April 2001) documents the analyses of predicted impacts and describes mitigation measures for unwanted beach response, ie. erosion. These mitigation measures includes: 1) pre-filling of a the predicted ebb bar shoal utilizing excavated sediments from the tidal basin in a beneficial use; 2) beach replenishment on a periodic basis with dredge material from the flood shoal; and 3) beach monitoring to compare actual beach response to the expected bounds of predicted behavior and to provide guidance for future beach replenishment needs.

Purpose and Scope

This Beach Monitoring Plan describes historical data and studies available for the area, and provides definition of monitoring activities and analyses that are expected to assure adverse impacts to area beaches are mitigated. The plan does not include analyses to validate previous or future predictive models of shoreline evolution or does it outline specific remedial action plans.

Prior and Ongoing U.S. Corps of Engineers Studies

The Bolsa Chica Lowlands Restoration Project jetties will be located within the limits of the San Gabriel River to Newport Bay Shore Protection Project of the U.S. Army Corps of Engineers (USACE), sometimes referred to as the Surfside-Sunset Beach Nourishment Project. This shore protection project periodically (about every five years) constructs a feeder beach at Surfside-Sunset to provide sand for beaches between Anaheim Bay and the Newport Pier. The project also includes the west Newport Beach groin field and has periodically placed sand at west Newport Beach. In addition, the project monitors beach widths on a monthly basis, occasionally performs beach profiles and has recently performed a lidar – helicopter

borne laser survey utilizing real-time-kinematic differential global positioning--topographic survey of the sub-aerial beach. Beach width measurement and recent profile locations in the vicinity of the proposed ocean inlet are shown on Figure 1.

The Coast of California Storm and Tidal Wave Study for Orange County included a field data collection activity of surveys and wave gages for the years from 1992 to 1995 for all of Orange County Between Seal Beach and Dana Point. This study analyzed the time series of beach profiles and provides quantitative measures of the historic variation in beach width and profile volumes.

A Feasibility Study of the erosion problem at Huntington Bluffs is currently being conducted which will include mapping of the Huntington Bluff top and the analysis of historic a projected bluff retreat rates.

Monitoring Activities

The Bolsa Chica Lowlands Restoration Project will monitor seven profiles between Warner Avenue and Huntington Pier, and 7 beach width locations, in addition to monitoring activities of the USACE, Los Angeles District. This monitoring shall continue for the life of the project or 1) until there are sufficient data on the beaches in this area to indicate that the system has reached a new equilibrium, 2) that the project is not having an adverse impact on adjacent beaches and 3) the Commission agrees, through a formal amendment request, to modifications to the monitoring.

The beach widths will be monitored monthly, typically around the 20th of each month to complement the USACE data set. Six of the seven beach will be measured at the same locations as the profiles. The beach width will not be measured at the Huntington Cliffs location (378+29; the beach width location for this section of beach will be measured at "The Ramp" (approximately Station 360). The final locations precise locations will be defined during the final design phase of the project.

The seven profiles will be measured from the back shore through the nearshore (to –35' or 40' MLLW) twice a year in the spring and fall, generally May and October, to correspond to the historic data set and capture typical post winter and post summer profile conditions. Final locations of the profiles will be selected during final design to coincide with historic profile locations, such as those shown on Figure 1. The tentative locations for the profiles will be at:

- Station 249+30
- Station 311+22
- 750' north of the centerline of the new channel inlet
- 750' south of the centerline of the new channel inlet

- Station 350+71
- Station 378+29
- Station 423+84

As a task during construction, a hydrographic survey of the pre-construction bathymetry and post-construction bathymetry in the region of the ebb shoal will be obtained. The detailed quantitative monitoring of the geomorphic evolution of the ebb shoal will not be obtained, however, it is expected that several beach profiles will transect the constructed ebb shoal and provide qualitative information on re-distribution of the pre-fill sediments. The primary monitoring effort is focused on the sub-aerial beach that is more easily measured and has a more direct connection to recreational beach use and coastal storm damage protection.

Analyses and Reporting

Beach monitoring (profiles, beach width and ebb bar) will be documented in annual reports submitted to CCC and the USACE, Los Angeles District (Attn: Coastal Engineering Section). The initial report will include the pre and post-construction hydrographic surveys of the ebb shoal area, and data on the as-built quantity and sediment grain size distribution of material placed in the pre-filled ebb shoal. Surveys and as-built data will also be provided on direct beach replenishment to areas adjacent to the jetties with materials excavated from the new ocean inlet.

Monthly beach width time series will be plotted and analyzed for trends. Anomalous and or unexpected changes in beach width will require the evaluation of other regional data to glean the separation of project induced effects from regional anomalies. The expected normal variation in beach widths and multi-year trends are represented in the 20-year record of beach widths shown in Figure 2 and statistically characterized in Table 1. Higher deviations resulting from direct on beach nourishment and re-distribution of the ebb shoal pre-fill should be anticipated, however, a running average of minimum beach widths below the historically observed values will be an indication of adverse project induced effects.

Beach profiles will be plotted to overlay with historic profiles, and the sub-aerial beach volume and shore-zone beach volume computed, as defined in Figure 3 and the Coast of California Storm and Tidal Wave Study, South Coast Region, Orange County, Chapter 4, Beach Width and Profile Volumes (draft) December 1999. The time series trend of these values will identify changes in availability of available littoral drift. Historic time series for Profiles in the Bolsa and Huntington Bluffs area are shown on Figures 4 and 5.

Commitments to Address Erosion

The monitoring plan will be used to determine the disposal locations for the periodic inlet and flood shoal dredging that is proposed for this project as well as to determine whether there are any unmitigated adverse impacts to the adjacent beaches. The final monitoring plan will develop clearly defined triggers and indicators of concern. The preliminary plan has identified the following actions:

1. If there are no indicators of erosion on adjacent beaches, the dredge disposal material will be spread on adjacent beaches within economical transport distant (within 5000 feet of the inlet location)

2. If there are indicators of erosion on adjacent beaches, dredge material, and other offshore sediment shall be used to address this erosion, regardless of location or economical transport concerns. Two erosion triggers have been developed now; additional triggers can be developed in the final plan.

    a. Acute Erosion: Any beach is found to be narrower that 50', based on two consecutive monthly beach width measurements.

    b. Chronic Erosion: Any 12-month rolling average of beach widths which deviate more than 2 standard deviations from the mean beach width, using 20 year historic record to establish these means and standard deviations (see Table 1)

3. If periodic monitoring indicates either acute or chronic erosion (based on the above triggers or other triggers developed in the final plan), a meeting shall be convened within one month of the identification of concern and shall provide for participation by all interested parties, including but not limited to the California Coastal Commission, the U.S. Army Corps of Engineers, the City of Huntington Beach and project managers. Within two months, the project managers shall have developed and be in the process of implementing all necessary steps to address the identified erosion.

Table 1 Historic Beach Width Statistics

Beach Width Statistics for Period Jan 1980 to Jan 2000

Station	192+96	247+88	307+88	424+44	502+87
Mean (feet)	317	210	109	172	284
Maximum (feet)	442	343	192	266	385
Minimum (feet)	144	156	40	60	209
Standard Deviation (feet)	78	25	24	34	33

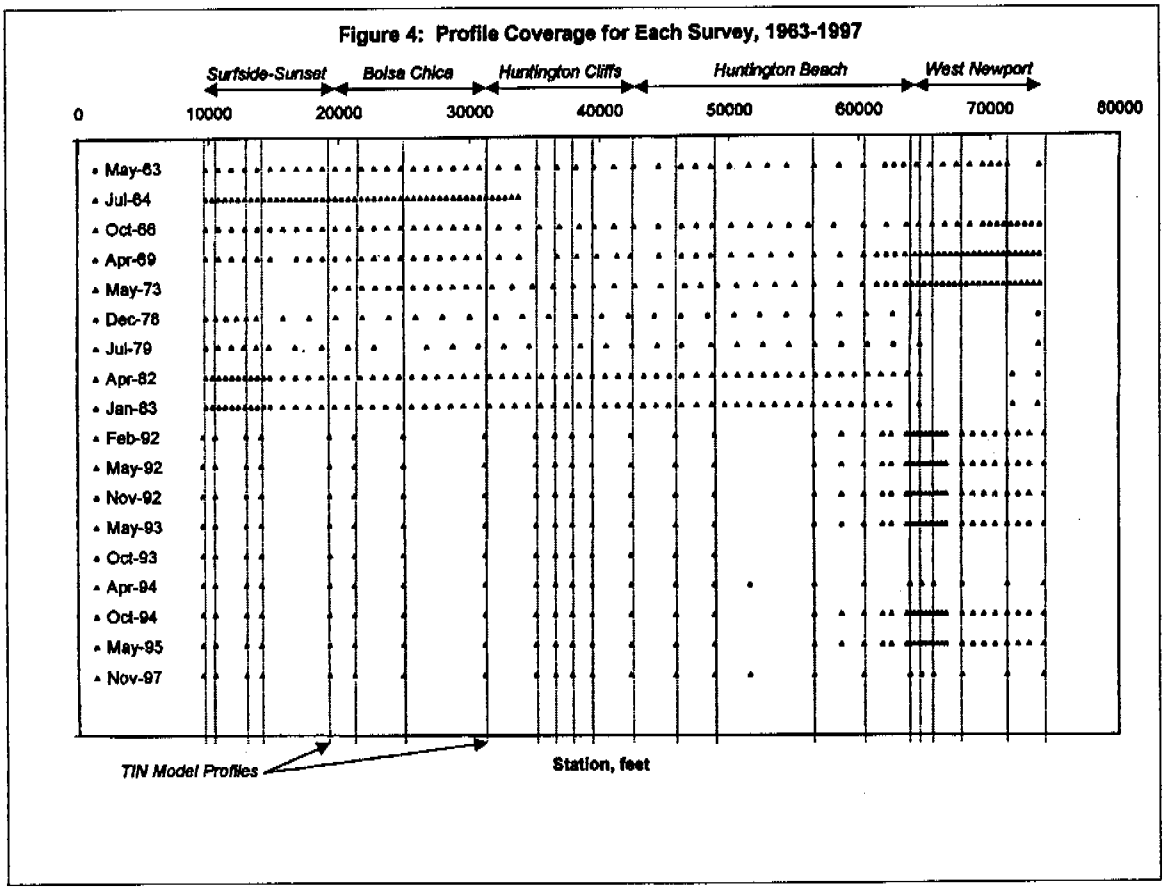


Figure A Historic Profile Coverage

Figure 1 Beach Width and Profile Location

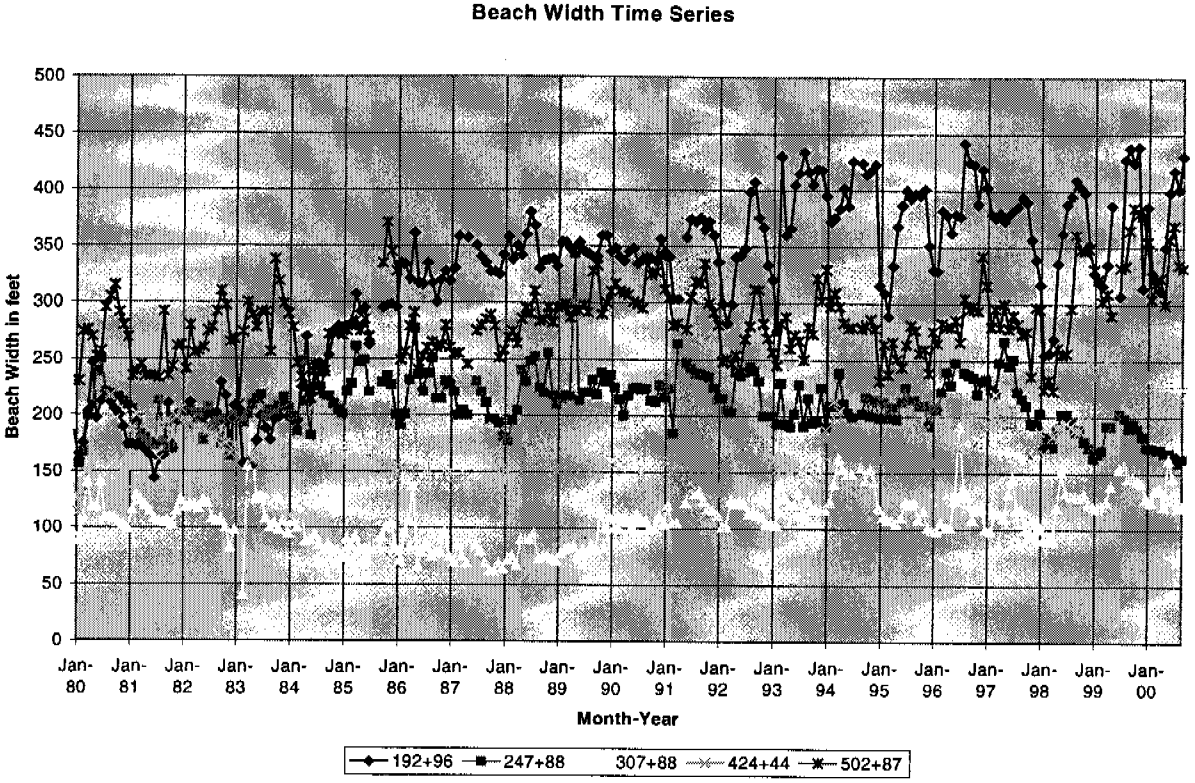


Figure 2 Beach Width Time Series

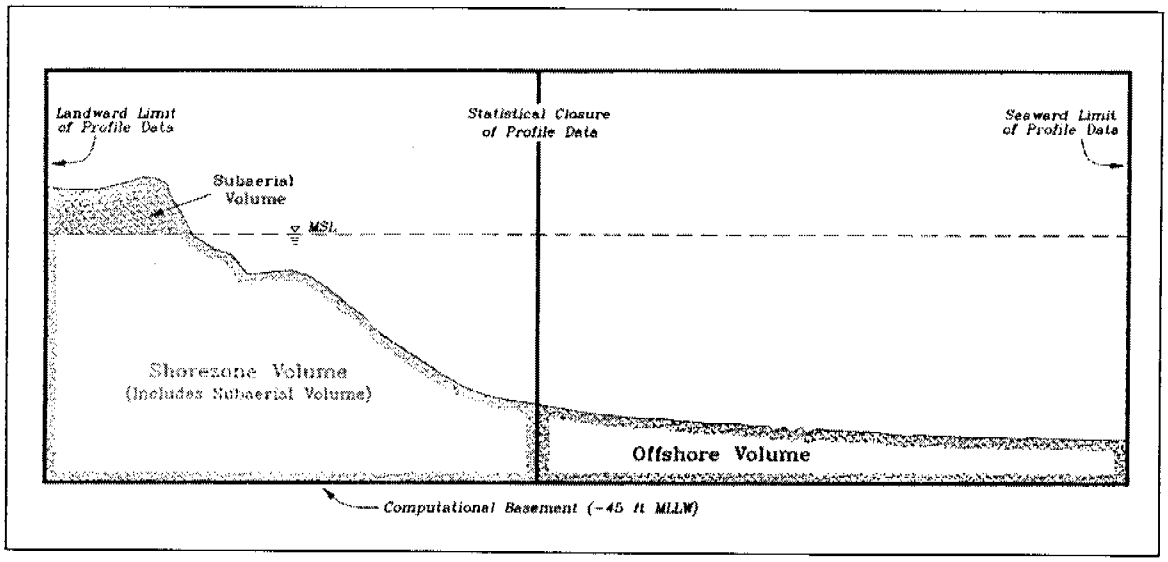


Figure 3 Cross-Shore Regions for Profile Volume Computation (CCSTWS, Figure 7, p.21)

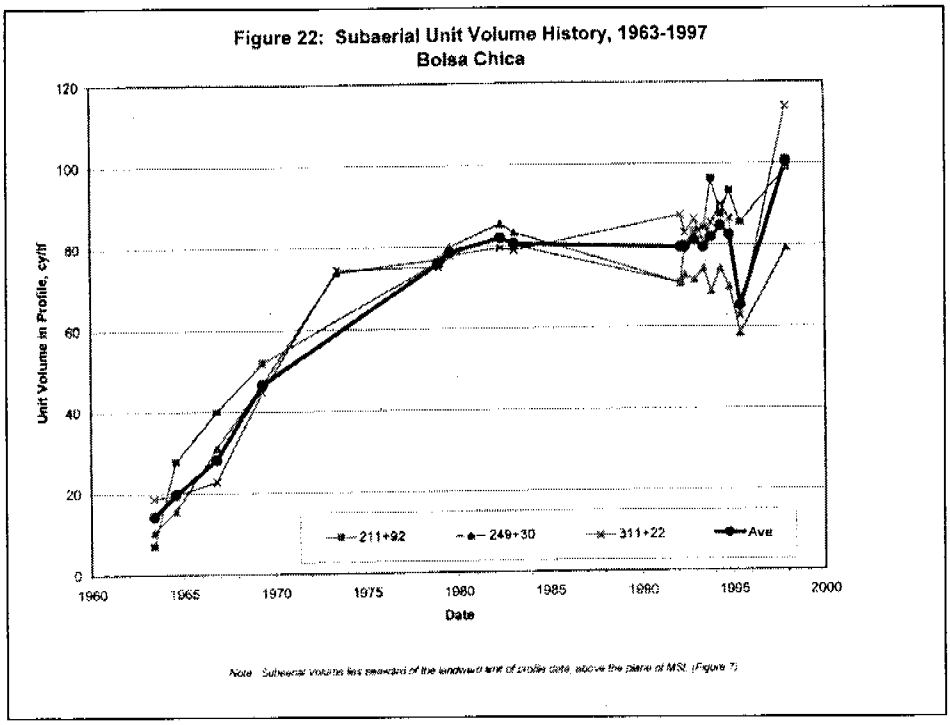


Figure 4 Sub-Aerial Unit Volume History, 1963-1997, Bolsa Chica

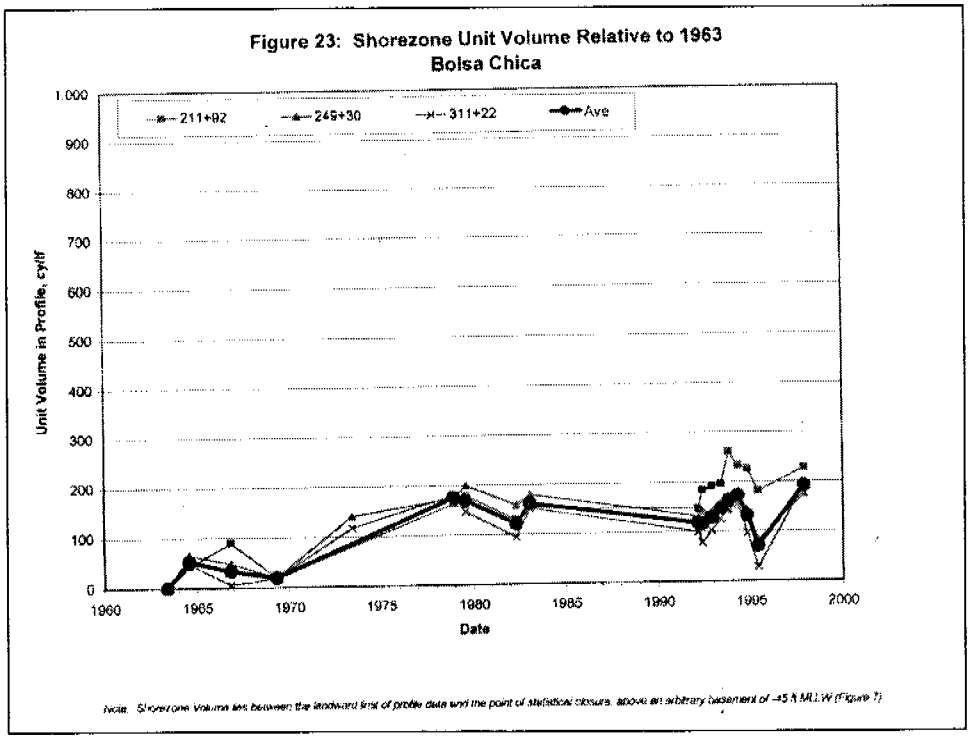


Figure 5 Shore-zone Unit Volume History, 1963-1997, Bolsa Chica

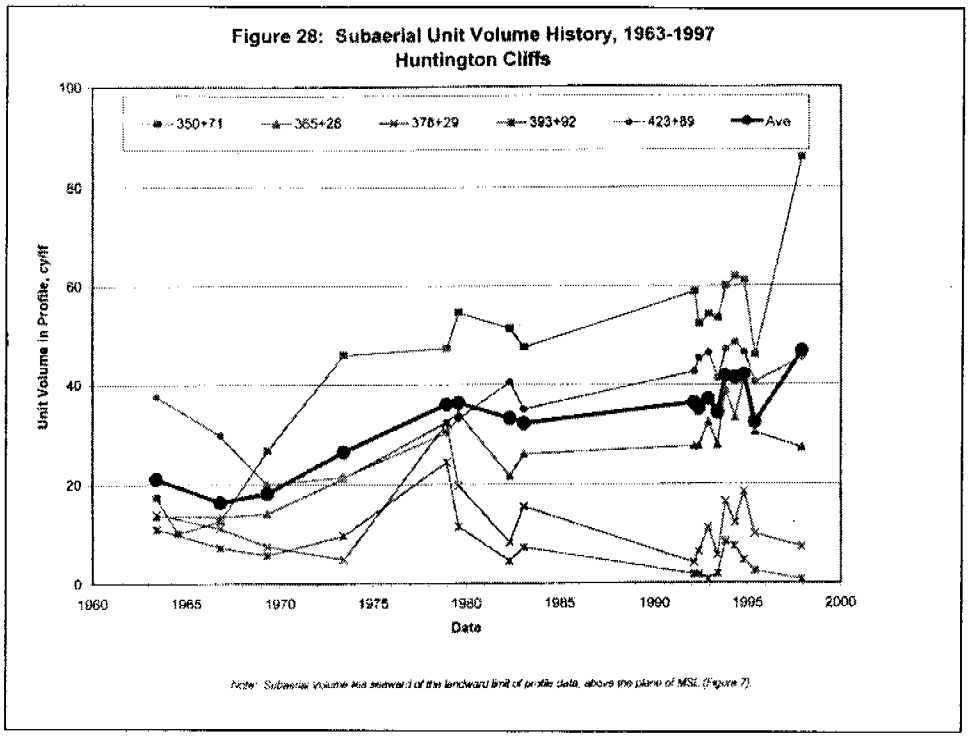


Figure 6 Sub-Aerial Unit Volume History, 1963-1997, Huntington Bluffs

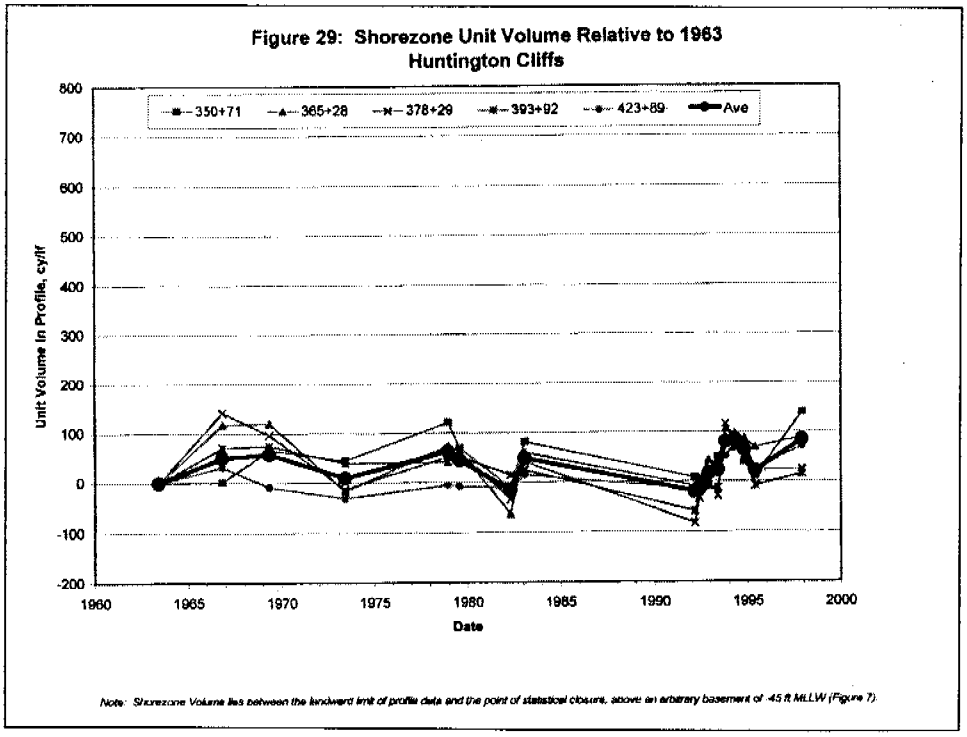


Figure 7 Shore-zone Unit Volume History, 1963-1997, Huntington Bluffs

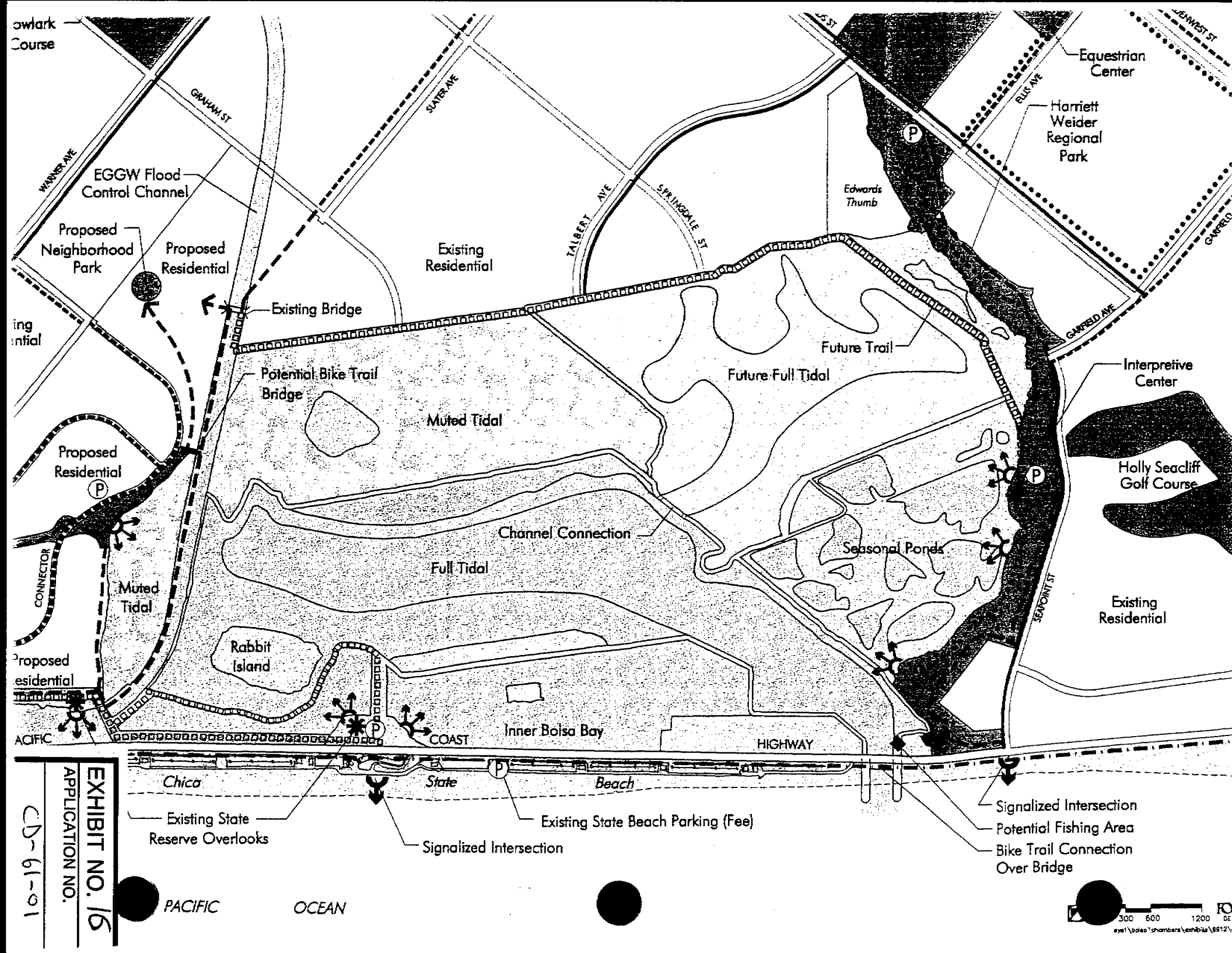
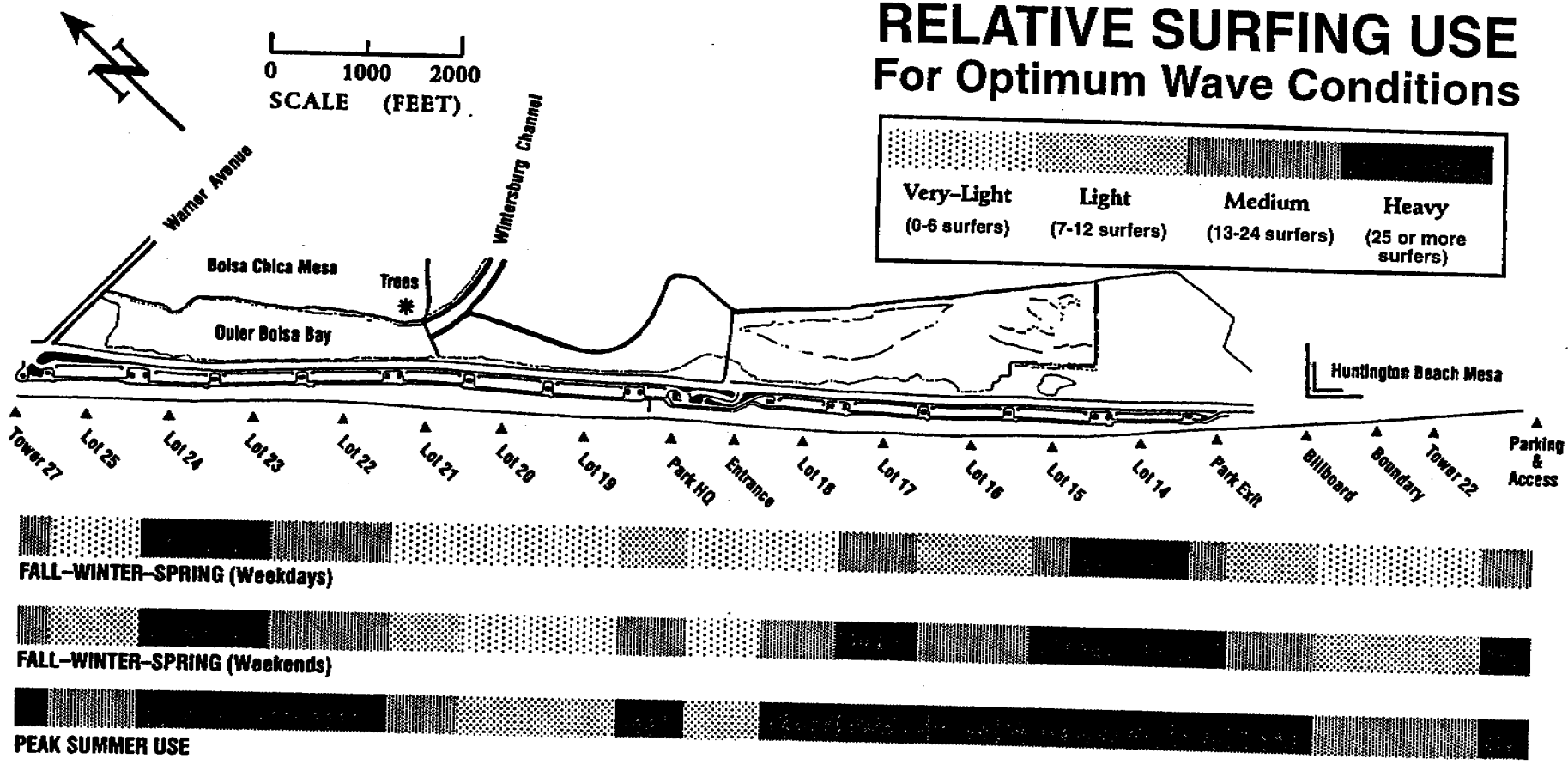


EXHIBIT NO. 16
APPLICATION NO.
CD-61-01

BOLSA CHICA STATE BEACH



rs Group

Source: Moffatt and Nichols Engineers 1991.

BOLSA CHICA STATE BEACH SURFING USE
Figure 3.8-1

Water Quality (bacteria) monitoring and remediation plan, expert review of modeling

A summary follows of some issues or circumstances on the "water quality" topic.

- Indicator bacteria are used to determine human fecal contamination. They are not very good "predictors" of human health risk, however.
- Epidemiological studies would be required to determine a human health threat from indicator bacteria in seawater. Even more elaborate studies would be necessary to separate the human health risk of bacteria from birds, versus bacteria from humans.
- Total coliform (TC) and fecal coliform (FC) have been used for a long time, enterococcus (ENT) is more recent. Some studies link high levels of ENT in seawater to human gastrointestinal illness; these studies assumed the ENT was of human origin.
- all warm blooded creatures produce the same bacteria as the indicator bacteria. DNA identification of bacterial strains may be used to identify the source of bacteria, but AB411 monitoring does not require this discrimination.
- AB411 requires monitoring of beaches used by more than 50,000 people annually. Huntington and Bolsa Chica State Beaches have been monitored since 1999 for this purpose, and will continue to be monitored by the County Sanitation District and/or County Health Agency.

- AB 411 posting thresholds in MPN/100 mL (most probable number or CFU/colony forming unit) are:
  Single Sample Standard - TC 10,000, FC 400, & ENT 104
  30-day Geometric Mean - TC 1,000, FC 200, & ENT 35
  (A lower Single Sample standard for TC of 1,000 applies when the TC to FC ratio falls below 10)
- AB 411 requires public warning of the presence of bacteria if a threshold is exceeded (e.g. posting). That is, a beach posting results if a threshold is passed, as determined by the County Health Officer. A beach may actually be closed if the exceedance is considered to be due to human sewage.
- Virtually any storm flows of urban runoff trigger widespread beach postings. Many of the dry season beach postings are attributed to urban runoff.
- Between 7-26-99 and 9-5-00, 99 dry season beach postings due primarily to ENT were recorded in Huntington State and City beaches with 72% of them being an exceedance of the single-sample threshold and 25% exceeding the geometric mean standard.
- dry season beach postings most frequently occur as a result of an exceedance that is present for a very short time. Practically speaking, due to delayed test results, beaches are actually posted the day after the bacteria were present.
- a gull flock, loafing (defecating) on beach just before water test sample is taken nearby may cause a brief exceedance.
- indicator bacteria are anaerobic and die when exposed to oxygen and UV light. The survival rate in cold, dark seawater is uncertain.
- Talbert Marsh bacterial study (Dr. Grant et al., UCI) involved 24 hr bacterial testing for 2-week period at end of May 2000. (A 3-week study of Talbert and Newport Slough marshes in 2001 may produce results by April of 2002.)
- Talbert Marsh is about 20 acres of tidal wetlands (restored to tidal influence in late 1980's by construction of new inlet and removal of flood channel dike) at downstream end of flood channels from 8600-acre urban watershed
- flood channel low-flow carries indicator bacteria into Talbert Marsh. The ocean sometimes carries indicator bacteria into Talbert Marsh.
- Birds deposit indicator bacteria into the marsh in their feces (flocks of 200-1000 gulls and elegant terns loaf on the flood shoal). Limited sampling indicates a 1000g gull contributes 1 million ENT in one fecal deposit.
- Inner Bolsa Bay, used by thousands of birds, and regularly monitored for indicator bacteria despite the absence of a beach, has never exceeded the ENT standard for a beach posting, and only rarely exceeded fecal coliform during a storm runoff event.
- Talbert Marsh was net exporter of indicator bacteria in May 2000. Export from Talbert Marsh occurred mostly on ebb tides following spring higher high tides which occurred at night during this study.
- Severe daylight die off of ENT was seen in the Talbert Marsh study.
- The frequency and location of beach postings in Huntington Beach in 1999 and 2000 cannot be explained solely by bacteria emanating from Talbert Marsh.
- Another theory has been proposed: bacteria laden water from sewer outfall 4 miles out, washes back inshore and is brought to surface by heated effluent from the electric power plant near Newland and PCH. Offshore sampling conducted in 2001 suggests this theory

may be valid under some oceanographic conditions.

- The nature or extent of indicator bacteria growth in the Talbert Marsh mud or plant debris is unknown.
- Dye studies confirm that seawater exiting Talbert Marsh on ebbing tide can sometimes wash along the shoreline inside the surfline, rather than uniformly dispersing.
- In 2000 and 2001, Orange Co. began diversion of all the Talbert Watershed low-flows to the sewage treatment plant. The City of HB diverts some of their pump station low-flows to the treatment plant, but no diversions are conducted outside of the Talbert Watershed.
- Examination of the records of beach postings in S Cal, does not implicate tidal wetlands in any chronic beach posting or closure situations.
- Bolsa Chica State Beach has, as many other ocean beaches not near tidal wetlands have, a low frequency of dry-season beach postings (1999-4 postings averaging 13 days per posting)
- Beaches near tidal wetlands (n=9) had an average of 2.2 postings averaging 12.3 days per posting. Even this low rate is probably attributable to wetlands that were intermittently tidal during 1999, such as San Elijo (5 postings, 31 days @) which underwent mechanical opening of the lagoon mouth to prevent anoxic conditions or fish kills in the lagoon. Beaches at the mouths of full tidal wetlands, such as Batiquitos Lagoon and Agua Hedionda, had only 1 posting in 1999 of two days, between them.
- The beaches of Orange County near creeks with known bacteria laden discharges had higher frequency of postings (Laguna Beach 20 and 66 days, and Aliso Beach 9 postings and 45 days per posting). Some OC beaches had no postings in 1999 with the average being 3.16 postings and 13.7 days per posting.

Despite the virtual absence of evidence that large, tidal salt marsh ecosystems with concomitantly large migratory bird populations are a human health threat, there has been some inquiry about the potential for a restored full tidal basin at Bolsa Chica to adversely influence the pattern of beach postings there. It is acknowledged that bird feces do contain indicator bacteria and that successful wetland restoration at Bolsa Chica is expected to attract large numbers of birds that may defecate in the tidal wetlands. Therefore, we attempted to predicted how much ENT bacteria from bird feces may be discharged to Bolsa Chica State Beach from the tidal basin under reasonably likely, as well as worst-case conditions, using water quality models.

We employed conventional and recognized water quality and hydrodynamic models and data-based assumptions about the types and densities of birds that would use the tidal basin, and amount of ENT bacteria they may deposit there. These model results were supplied to CCC, and widely distributed, in July and August. Even under the worst case assumptions (bacteria never die, five times a "normal" density of birds, large flocks of birds loafing on an hypothetical flood shoal, neap tides), the concentration of ENT arriving at the beach from the tidal basin was an order of magnitude below the lowest threshold for a beach posting.

The methods and conclusions of these modeling analyses have been available to all interested parties for several months. We are also arranging to receive written remarks from professionals involved in some aspect of the this issue who may be willing to take the time to do so.

In summary, there is no evidence of human health hazard from southern California tidal salt marshes used by thousands of birds, or increased health warning postings that can be attributed to the tidal salt marsh ecosystem. Bird feces contain the same bacteria as are used as AB411 indicator bacteria. We modeled the movement of bacteria from reasonable and "worst-case" bird defecation concentrations in the proposed full tidal basin. We concluded that the tidal basin would not contribute to beach postings at Bolsa Chica State Beach even if used by incredibly high concentrations of birds. Lastly, the proposed tidal basin would have no urban runoff or sewage routed through it to the beach.

It is expected that AB411 monitoring will continue in the manner called for in the law or as the law may be revised. Monitoring of bacteria within the proposed Bolsa Chica tidal wetland appears to be unwarranted, at this time. Similarly, development of a remediation plan, in the absence of evidence of a problem, also seems unwarranted..

Table 4.5-3
Acres of Major Habitat Types for Each Alternative

	No Action	Proposed Project	1st Sub-Alternative	2nd Sub-Alternative	1	2	3	4	5	6
Perennial pond	48.8	19.4	10.2	10.2	19.4	19.4	19.4	19.4	13.4	19.4
Managed tidal water	0	0	0	0	0	0	0	0	35.4	0
Muted tidal water	0	1.38	1.38	1.38	0.01	0.01	0.01	0.01	0	1.38
Full tidal water- violates criteria	0	0	0	0	183.5	217.2	140.1	194.9	0	0
Full tidal-sometimes violates criteria	0	0	0	0	0	0	0	0	0	175.5
Full tidal water- doesn't violate	0	175.5	181.5	175.5	0	0	0	0	0	0
Seasonal pond/flat	348.5	192.2	80.4	80.1	192.1	192.2	192.2	192.2	219.2	192.2
Full tidal mudflat - violates criteria	0	0	0	0	150.8	46.1	101.1	61.9	0	0
Full tidal mudflat-sometimes violates	0	0	0	0	0	0	0	0	0	122.6
Full tidal flat-doesn't violate criteria	0	122.6	240.4	312.3	0	0	0	0	0	0
Muted tidal mudflat	0	42.3	42.3	42.3	22.7	23.2	23.2	23.2	0	42.3
Managed tidal mudflat	0	0	0	0	0	0	0	0	189.1	0
Cordgrass	0	30.5	74.5	78.2	29.5	50	55.8	30	0	30.5
Nontidal pickleweed	296	65.3	21	21	64.6	65.3	65.3	65.3	21.3	65.3
Managed tidal pickleweed	0	0	0	0	0	0	0	0	262.1	0
Muted tidal pickleweed	0	126.3	126.3	126.3	108.9	112.8	113.3	110.8	0	126.3
Full tidal pickleweed	0	19.1	20.3	20.3	18	67.6	69.5	62.5	0	19.1
Upland and saltgrass	318.1	216.9	213.1	143.9	222	217.8	231.5	234	271	216.9

Post-Construction Impacts, Proposed Project and Alternative 6

Habitat	Long-Term Loss or Gain in Habitat[1] Compared to Existing Condition	Long-Term Loss or Gain for Birds Compared to Existing Condition	Level of Impact
Full Tidal Subtidal	+175.5 acres in full tidal basin	Addition of 175.5 acres of roosting/ foraging habitat for brown pelican & 30–40 species of waterfowl, wading birds, & aerial fish foragers	Class IV
Full Tidal Intertidal Mudflat	+122.6 acres in full tidal basin	Addition of 122.6 acres of roosting and foraging habitat for 30–40 species of wading birds, shorebirds, aerial fish foragers	Class IV
Full Tidal Pickleweed	+19.1 acres in full tidal basin	Addition of 19.1 acres of nesting and foraging habitat for BSSP[1], resulting in up to 133 new BSSP[1] territories[2]	Class IV
Full Tidal Cordgrass	+30.5 acres in full tidal basin	Addition of 30.5 acres of potential habitat for light-footed clapper rail, resulting in up to 15 clapper rail pairs[3]	Class IV
Muted Tidal Pickleweed	+126.3 acres from addition of muted tidal influence to existing nontidal saltmarsh	Enhancement of 126.3 acres of existing nesting and foraging habitat for BSSP, resulting in up to 267 new (290 total) BSSP territories	Class IV
Muted Tidal Mudflat	+42.3 acres in muted tidal basin	Enhancement of 42.3 acres of nontidal flats for 30–40 species of wading birds, shorebirds	Class IV
Muted Tidal Channel	+1.38 acres in muted tidal basin	Enhancement of 1.38 acres of nontidal channel for foraging habitat for BSSP, SNPL,[4] and least tern	Class IV
Nontidal Pickleweed	-230.7 acres to muted tidal pickleweed	Loss of 230.7 acres of low-quality habitat for 10–20 species of waterfowl, wading birds, and upland birds, offset by creation of full tidal and muted tidal pickleweed (see above)	Class III
Nontidal Flats	-156.3 acres to full tidal & muted tidal basins	Loss of 156.3 acres of potential SNPL foraging habitat and of low-quality roosting/foraging habitat for 20–30 species of waterfowl, wading birds, and shorebirds, offset by creation of full tidal & muted tidal mudflat (see above)	Class III
Nontidal Channel	-29.4 acres to full tidal & muted tidal basins	Loss of 29.4 acres of low-quality habitat for 10–20 species of waterfowl, wading birds, & upland birds, offset by creation of full tidal subtidal (see above) and 1.4 acres of muted tidal channel	Class III
Nontidal Saltgrass	-26.3 acres to full tidal & muted tidal basins	Loss of 26.3 acres of low-quality foraging habitat for BSSP and less than 5 species of upland birds, offset by creation of full tidal and muted tidal pickleweed (see above)	Class III
Nesting Sites 1, 2, & 3	+22 acres of upland habitat	Addition of 22 acres of nesting habitat for SNPL and least tern, resulting in up to 17– 88 SNPL nests and 88–352 least tern nests	Class IV
Upland	-101.2 acres to full tidal & muted tidal basins	Loss of 101.2 acres of low-quality habitat for 10–20 species of upland birds, offset by creation of higher quality habitats (see above)	Class III
Rabbit Island Upland	-26.4 acres of a total of 42 acres on Rabbit Island after exposure to full tidal influence	Loss of winter roosting and foraging habitat for short-eared owl; loss of winter roosting and foraging habitat for northern harrier	Class III Class III

[1] BSSP = Belding's savannah sparrow.
[2] Based on an average of 7 territories/acre at the Santa Margarita River (Zembal 1986), although a study at Anaheim Bay showed 14 territories/acre (Massey 1990).
[3] Based on a density of 0.5 clapper rail pairs/acre at Upper Newport Bay (Zembal 1991).
[4] SNPL = western snowy plover.

WSP and BSS impacts

The existing conditions for both western snowy plover and Belding's savannah sparrow are described on FEIR/S pages 3-114 to 3-118. The Service completed a Biological Opinion, pursuant to section 7 of the Federal Endangered Species Act. That Biological Opinion addresses all the issues of the federally listed, Threatened western snowy plover at Bolsa Chica and is included with the FEIR/S in Appendix H.

+ 4-92 → 4-99

Most of the physical change would be in the proposed full tidal basin (within about 380 total acres, the dredge footprint is about 176 acres of cut, the cordgrass shelf about 30 acres if fill, and the nesting area #1 and levee about 15 acres of fill). Even if not in the dredge or fill footprint, much of the non-tidal pickleweed is currently persisting at too low an elevation to survive once full tidal influence is restored to the proposed tidal basin, except around Rabbit Island. (Once established, cordgrass may eventually grow into the appropriate tidal salt marsh zone around Rabbit Island, as well.)

Summary of Habitat Change within the Proposed Tidal Basin

Habitat Type	Existing	Proposed Project
upland	99 (oil roads/pads and iceplant)	30 (Rabbit I, nest area #1, levee)
seasonal pond/flat	142	0
non-tidal pickleweed	138	0
intertidal salt marsh	0	49 (incl 30 ac cordgrass)
intertidal mudflat	0	123
subtidal *	0	176

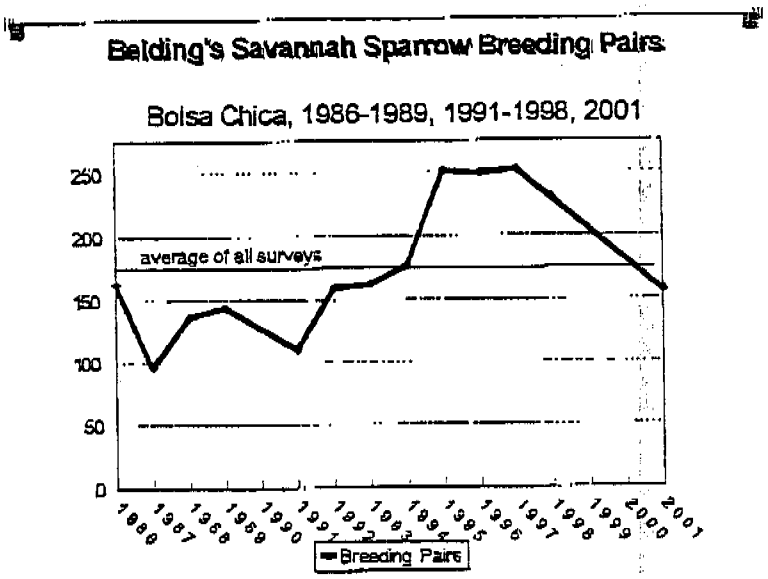
*not counting inlet area seaward of the bridge

Thus, about 60% of the total tidal basin area, much of which is non-tidal pickleweed, would be directly disturbed during construction. This pickleweed is used to varying degrees by Belding's savannah sparrow for nesting. The non-tidal pickleweed within the proposed tidal basin would be incrementally made unavailable to nesting Belding's savannah sparrow during the 3 years of phased construction, requiring first clearing and grubbing, then hydraulic dredging, and lastly restoration of a full tidal range.

The Muted Tidal area (about 200 ac.) would have very little physical change as the existing wetlands and seasonal ponds are to have muted tidal influence established, which will enhance

the habitat value, particularly for Belding's savannah sparrow nesting. The Seasonal Ponds (120 ac.) and Future Full Tidal (250 ac.) areas are to be managed to maintain their existing conditions and habitat values as seasonal ponds and flats. Inner and Outer Bolsa Bay (175 ac.) would be kept intact, as well. Nearly, 800 acres of the project area are kept just as they currently exist or enhanced.

Since so much of the total area would not be adversely altered for Belding's savannah sparrow nesting and supports a relatively low density of nesting territories, it is possible that breeding pairs displaced from part of the tidal basin due to construction activities, may simply relocate to another undisturbed and unoccupied pickleweed area in the lowland. About one fourth of total territories, are within the area to be cleared and grubbed in the first season. However, our belief is that Belding's savannah sparrow nesting density is largely related to the vigor and productivity of the pickleweed, and associated community of organisms found in tidal, muted tidal, or salty wetter areas. Therefore, to assure no harm to the species, we would be making interim improvements to suboptimal nesting habitat outside the tidal basin construction area to increase the likelihood of any displaced pairs finding suitable nesting habitat. We intend to conduct interim water management in muted tidal areas during the several years of construction of the tidal basin. Because muted tidal influence in the proposed muted tidal area can be achieved only following completion of the inlet and full tidal basin, this interim water management will likely entail pumping of surface water into or out of some part of the muted tidal area. As construction lead, we would make such interim water management decisions, but the action would be carried out by the construction contractor. Consequently, better definition on the actual measures and timing of the action shall wait until final design is completed, the construction schedule is more clearly defined, and the bid specifications are prepared.



In sum, within the proposed tidal basin, all of the non-tidal pickleweed and seasonal ponds would be converted to tidal habitats of higher habitat value for a miriad of species, with all manifestations of the oil field (roads, pads, wells, pipelines and contamination) being removed. Wetland area (vegetated wetlands, intertidal mudflats, and subtidal water) would be increased in acreage by about 70 acres. Intertidal salt marsh zones would be increased, especially the cordgrass zone, such that Bolsa Chica could eventually support a significant breeding population of the critically endangered light-footed clapper rail. As the subtidal area were to become

shallow aquatic bed (eelgrass) it would greatly increase the wetland ecosystem values there. All these benefits come at the expense of non-tidal pickleweed, seasonal flats, and oil field structures. Belding's savannah sparrows, which may currently nest in the full tidal basin area would be displaced to the muted tidal area, which will be improved through interim water management during construction and muted tidal influence thereafter.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
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APR 16 2001

Colonel John P. Carroll
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
Los Angeles, CA 90053-2325

Attention: Environmental Branch, Pam Castens, and Regulatory Branch, Russ Kaiser

Re: Formal Section 7 Biological Opinion on the Bolsa Chica Lowland Restoration Project, Orange County, California (FWS Log No. 1-6-01-F-1653)

Dear Colonel Carroll:

This document provides the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Bolsa Chica Lowland Restoration Project located in Huntington Beach, Orange County, California, and its effects on the California least tern, light-footed clapper rail, western snowy plover, and California brown pelican in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your April 12, 2001 request for formal consultation was received on April 12, 2001.

This biological opinion is based on information found in our July 2000 draft Environmental Impact Statement/Report (Chambers Group, Inc. 2000), field investigations and reports conducted by the Service throughout 1997-2000, and other information available in our files. A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

The Service and the Corps of Engineers (Corps) are two members of the eight agency Steering Committee implementing the subject project pursuant to a 1997 interagency agreement addressing acquisition and restoration of the Bolsa Chica lowlands, Orange County, California (see Figure 1). The Service and the Corps are co-leads on the preparation of the Environmental Impact Statement/Report, pursuant to the National Environmental Policy Act (NEPA). The Service is also preparing an Ecological Risk Assessment to address the cleanup of oil field

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contaminants at Bolsa Chica. The Service will also conduct the construction of the restorati plan in accordance with the NEPA Record of Decision jointly prepared by the Corps and the Service, California Coastal Commission final approval, and the Corps section 10/404 permit pursuant to the Clean Water Act and Rivers and Harbors Act. The Service has been conducting field work related to the preparation of the EIS/R and the Ecological Risk Assessment (1997-2001).

As Steering Committee members and co-leads on the EIS/R, the Corps and the Service have considered endangered, threatened, and sensitive species throughout the planning and document preparation phase of the Bolsa Chica Lowland Restoration Project. To date, the Corps and the Service have mutually considered our interactions to be informal consultation, as we have been identifying potential adverse effects upon listed species and ways to avoid them. We have also mutually determined that the draft EIR/S suffices as the Biological Assessment required by the Act and that the section 7 consultation conclusion would be included in the Final EIR/S.

The potential for an affect of the proposed project upon the California least tern, *Sterna antillarum browni*, light-footed clapper rail, *Rallus longirostris levipes,* and California brown pelican, *Pelecanus occidentalis californianus,* was considered in the draft EIR/S. The proposed project contains features or elements that may benefit these species. Construction activities that may affect the least tern nesting at Bolsa Chica are to occur outside the least tern breeding season. We concur with the Corps determination on these three listed species are not likely to be adversely affected by the proposed project. Therefore, these three species are not considered further in this Biological Opinion. In addition, no Critical Habitat has been designated for any these three listed species.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The following description is a summary of the proposed action. A complete description of the proposed project, extracted from the draft EIS/R, is enclosed as an appendix.

The proposed project includes the creation of about 367 acres of habitat that would receive a full tidal range through a new ocean inlet and enhancement of another 200 acres of salt marsh under a muted tidal influence. About 252 acres of seasonal ponds and oil field facilities would be retained in their existing condition. About 120 acres of seasonal ponds and the tidally influenced portions of the Bolsa Chica Ecological Reserve would be retained in their existing condition.

The new 360-foot wide inlet with short jetties would cross the beach near the southerly end, beside the Huntington Mesa. About 175 acres of the tidal basin would be dredged to create a shallow slough channel, producing about 2.7 million cubic yards of dredge material. Some of the dredge material would be deposited in the tidal basin to create about 50 acres of intertidal elevations suitable for the growth of the salt marsh plant, cordgrass, *Spartina foliosa*. Most of the dredge material would be discharged in the nearshore ocean zone to pre-fill the ebb shoal of

the new inlet, with the remainder being used to construct a berm around the basin and four new esting areas. Oil wells, pipelines, and roads would also be completely removed from the tidal basin.

Conservation Measures

The following conservation measures have been incorporated into the proposed project to avoid and/or minimize adverse impacts to federally listed species.

- The construction would be phased over several years due to seasonal shutdown of certain activities so as to avoid habitat disruptions to Federally listed threatened or endangered species.
- Discharges of dredge material in the nearshore zone will be conducted when the least tern has migrated away from the Bolsa Chica nest site.
- Several additional nesting areas suitable for western snowy plover and California least tern will be constructed.
- About 40 acres of intertidal area will be constructed and revegetated with cordgrass to encourage nesting by the light-footed clapper rail.
- Biological monitoring would be conducted during and after construction, and some management actions beneficial to listed species (e.g. predator removal, water level management) are underway and would continue.
- Construction equipment would not be allowed to operate next to active snowy plover or California least tern nest sites.
- The completed restoration project would be managed and maintained for the benefit of ish and wildlife, using an established maintenance endowment.

STATUS OF THE SPECIES/CRITICAL HABITAT

Western Snowy Plover

The western snowy plover, *Charadrius alexandrinus nivosus*, is a sparrow-sized, white and tan colored shorebird with dark patches on either side of the neck, behind the eyes, and on the forehead. The Pacific coast population of the western snowy plover is reproductively isolated from the interior populations. The coastal western snowy plover population is defined as those individuals that nest adjacent to or near tidal waters and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays, and estuaries. The breeding range of the western snowy plover extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. The coastal population of the western snowy plover consists of both resident and migratory birds (Warriner *et al.* 1986). In southern California, some snowy plovers spend the winter in the same areas used for breeding, while other birds relocate to and from other coastal breeding sites (Collier and Powell 2000).

Sand spits, dune backed beaches, sparsely to unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal nesting areas of the western nowy plover. Other areas used by nesting western snowy plovers include dredge spoil fill, dry

salt evaporation ponds, and salt pond levees (Wilson 1980, Page and Stenzel 1981). Nest sites typically occur in flat, open areas with sandy or saline substrates with little or no vegetation (Page and Stenzel 1981). Most western snowy plover breeding adults are site faithful, returning to the same breeding location in subsequent breeding seasons.

The breeding season of the western snowy plover extends from March 1 through September 15. Egg laying begins in mid-March and continues through late-July. Generally, 3 eggs are laid in a nest which consists of a shallow depression scraped in sandy or saline substrates. Some nests are lined with plant parts, small pebbles, or shell fragments. Incubation does not begin until the full clutch is laid and continues for 26-32 days with an average of 27 days before eggs are hatched. Both sexes incubate the eggs. Snowy plovers will renest after loss of a clutch or brood (Warriner *et al.* 1986).

Snowy plover chicks are precocial and leave the nest within hours of hatching in search of food. The tending adult(s) provide danger warnings, thermoregulation assistance, and guide the chicks to foraging areas, but do not provide food to their chicks. Broods rarely stay in the immediate area of the nest (Warriner *et al.* 1986). Young birds are able to fly within approximately 31 days of hatching.

Double brooding and polygamy have been observed in snowy plovers along coastal California (Warriner *et al.* 1986). If polygamous, snowy plover females may abandon chicks as young as 6 days old to find another mate. This leaves the male as the only adult to care for the brood (Warriner *et al.* 1986). Males attend their young for 29-47 days (Warriner *et al.* 1986). Renesting may occur within the initial nesting area or snowy plovers may move to another nesting site (Warriner *et al.* 1986, Collier and Powell 2000).

Western snowy plover adults and young forage on invertebrates along intertidal areas, along beaches in wet sand and surf cast kelp, in foredune areas of dry sand above the high tide, on salt pans, and along the edges of salt marshes and salt ponds. The snowy plover is primarily a run and glean type of forager. Page *et al.* (1981) observed western snowy plovers moving between salt pans, tidal flats, and beaches indicating these areas function together in providing habitat for the species.

Human disturbance can interfere with normal western snowy plover behavior. Disturbances to incubating adults can leave nests exposed to extreme temperatures resulting in non-viable eggs. Western snowy plover chicks which are separated from their attending adult as a result of human disturbances or predators may become more susceptible to hypothermia since young chicks are less able to thermoregulate.

Poor reproductive success resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to urban development and the encroachment of introduced beachgrass, has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States. In southern California, the very large human population and the resultant beach recreation activities by humans have precluded the western snowy plo

om breeding on historically used beach strand habitat. As a result of these factors, the Pacific ast population of the western snowy plover was Federally listed as a **Threatened** species on March 5, 1993 (58 Federal Register 12864).

The proposal to designate western snowy plover Critical Habitat was published on March 2, 1995 (60 FR 11768) and the Final Rule designating western snowy plover Critical Habitat was published December 7, 1999 (64 FR 68508). No area of Orange County was designated Critical Habitat for the coastal population of the western snowy plover. Bolsa Chica was not designated for two principle reasons, a) the property had been acquired for habitat conservation and restoration purposes, b) recovery plans for the critically endangered light-footed clapper rail, *Rallus longirostris levipes*, may be in conflict with western snowy plover Critical Habitat designation in restorable diked salt pond areas.

While there were no observations of western snowy plover nesting in Los Angeles County in the last ten years, incidental observations of western snowy plover breeding in Orange County have been noted. For example, a single nest was observed inside the California least tern nesting area at Huntington State Beach in 1993 (Doreen Stadtlander, pers. comm.). Year-round bird counts in 1992-1993 at Bolsa Chica indicated low numbers of nesting western snowy plover and larger numbers of winter migrants (Guthrie *et al.*, 1993). In a single day of observation at Bolsa Chica in June 1995, 8 nesting pairs were estimated (Lee Jones memorandum 1995).

Regular (weekly) surveys specifically for western snowy plover nesting at Bolsa Chica were onducted for the first time in 1996 (Guthrie 1996). That study estimated 33 nest attempts and eported a maximum of 27 individuals in September. Service studies began in 1997. Thirty total nests were identified between April and August with a maximum of 8 nests at any one time (Fancher 1998). In that same year, the breeding population in May was estimated to be 20 males and 14 females, with the total number of western snowy plovers present at Bolsa Chica climbing to nearly 70 individuals in August with the influx of migrants. In 1998, 34 total nests were located, with a peak of 12 nests active at one time in July. The May breeding population was estimated as 16 males and 11 females (Fancher *et al.* 1998). In 1999 and 2000, the breeding population was 11 and 16 males and 12 and 15 females, respectively. The total number of nests in 1999 was 38, of which 11 were predated. There were 39 nest attempts in 2000, with 19 taken by predators (Fancher *et al.* 2001).

During the four years of the Service study of snowy plover nesting at Bolsa Chica, 21 percent of all nests were initiated in Cell 11, 20 % in Cell 4, 16 % in Cell 10. These three cells accounted for the placement of 57% of all snowy plover nests. One to several nests were regularly placed in several other cells (such as 14, 19, or 22, 62, and the road top west of Cell 3) and some cells were used only in a couple of years (such as 8, 9, 17, and 36) or just one of the four years (such as Cells 18 and 19). Snowy plover nest locations, 1997-2000, are shown on enclosed Figures 3a-d from Fancher *et al.* 2001.

In the last four years, snowy plover nesting activity at Bolsa Chica has begun no earlier than March 19th and no later than April 25th, and concluded no earlier than July 27th and no later than ugust 16th. The peak number of active snowy plover nests at Bolsa Chica was 12 in late June of

1998 and 1999. Multiple peaks between 8 and 10 nests occurred in May and June of 1997 and 2000. See enclosed Figure 10 from Fancher *et al.* 2000.

Snowy plovers largely disappear from the Bolsa Chica lowlands during the winter, but are thought to remain along southern California's beaches. About 40 were seen along Bolsa Chica State Beach in January 2001 during the PRBO State-wide winter window survey (Gary Page, pers. comm.). In late March/early April through May, between 20 and 30 snowy plovers are typically seen in the Bolsa Chica lowland. In some years, such as 2000, large numbers of migrating snowy plovers show up at Bolsa Chica as soon as early July. The influx of between 60 and 80 migrating snowy plovers is more typical of late July and early August, however. See enclosed Figure 9 from Fancher *et al.* 2001.

While the number of banded snowy plovers seen at Bolsa Chica is not large, these sightings confirm the relocation of breeding individuals within the site and the region. A female, banded as a chick in 1997 at Camp Pendleton, attempted to nest there in 1998 but established a successful nest at Bolsa Chica within a month of losing the first nest. This bird produced two broods from two nests at Bolsa Chica in 1999. She nested three times at Bolsa Chica in 2000, but only produced one brood. Of her six nests at Bolsa Chica 1998-2000, three were attempted in Cell 4 but each in a different year. In years with multiple nest attempts, each nest was placed in a different location (Cell 4, 11, and 22). Several snowy plovers banded elsewhere (such as Chula Vista Wildlife Preserve, Camp Pendleton, and Batiquitos Lagoon) have been seen nesting at Bolsa Chica. One female banded as a chick at Bolsa Chica in 1999, twice attempted nests there in 2000, and one attempt produced a brood. A male sibling, also banded as a chick at Bolsa Chica in 1999, successfully reared a brood at Bolsa Chica in 2000. One chick banded at Bolsa Chica in 1999 was seen nesting at Monterey Bay in 2000.

The next nearest breeding concentration of snowy plovers from Bolsa Chica is at the Santa Margarita River mouth about 50 air miles to the south and Ormond Beach about 70 air miles to the north. Regular nesting censuses of breeding snowy plovers in California were not conducted at all sites but were conducted 1994-1998 in San Diego County (Powell *et al.* 2000). Ranked by total number of nest attempts in 1997, Bolsa Chica was fourth, after Santa Margarita River (61 nests, Camp Pendleton), Batiquitos Lagoon (38 nests), and Naval Amphibious Base Coronado (38 nests). In 1998, Bolsa Chica ranked second only to Santa Margarita River (68 nests), and was followed by NAB Coronado (27 nests) and Batiquitos Lagoon (26 nests). Other than Bolsa Chica, no known snowy plover nesting occurs in Los Angeles or Orange Counties. Thus, within the Los Angeles-Orange-San Diego Counties region, Bolsa Chica is one of the most active snowy plover breeding areas, primarily attributable to the security requirements for the operating oilfield that excludes the general public.

The highest concentrations of snowy plover nesting in southern California are on the very few beach strand areas that are protected from intense human beach recreation use, such as the military bases, Camp Pendleton Marine Corps Base and Naval Amphibious Base, Coronado. Some snowy plover nesting occurs on man-made substrates, such as landfills or dikes. In 1995, construction began of the large-scale tidal wetland restoration at Batiquitos Lagoon, San Diego County. That project included constructed nesting areas for least tern and western snowy plover.

Snowy plover nesting use at Batiquitos Lagoon doubled over pre-project levels because of the creation of the nesting areas. By 1997 and 1998, snowy plover nesting use of the created nest sites was 5-8 times that of pre-project levels (Keane Biological 1998). However, snowy plover nesting success at Batiquitos Lagoon has declined significantly (Powell and Collier 2000). Ineffective protection of snowy plovers from predators and insufficient nest site preparation are considered to be the problem. Predation pressure upon breeding snowy plovers in southern California is great, and active predator management programs are in place, irrespective of whether the nesting area is constructed or "natural".

Predation pressure on snowy plovers breeding at Bolsa Chica is also significant, causing severe egg loss, as in 2000, or severe chick loss in 1999, despite predator management activities. Fledglings produced per nest was only 0.61 in 1999, and was 1.08 fledglings per nest in 2000. The most damaging predators on snowy plover eggs and chicks at Bolsa Chica are common crows, *Corvus brachyrhynchos*, and American kestrel, *Falco sparverius*, respectively. These species are very abundant in the surrounding urban areas and are diligently trapped and removed from the Bolsa Chica lowland during the snowy plover breeding season (Ross 1999 and 2000).

Breeding season censuses of snowy plovers throughout the California coastal breeding range are relatively rare, but have been organized and summarized by Point Reyes Bird Observatory. Those findings indicate a decline in the statewide coastal breeding population of snowy plover from 1,371 adults in 1991 to 976 adults in 2000. However, the number of breeding adults estimated in Orange and San Diego Counties was 88 in 1991, and 171 in 2000 (Gary Page, pers. comm. 2000). This may or may not be an increase, since survey effectiveness may have improved in the later census. For example, the 1991 estimate of breeding adults at Bolsa Chica was 5, yet conditions in 1991 were largely unchanged from those found in later years when the Service began systematic surveys and estimated 27 breeding adults (less than 3% of the State total) during the PRBO window survey in 2000. With predation upon snowy plover eggs and chicks being the most significant influence, nest success and fledgling production has varied widely among the southern California nesting sites.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Despite the extensive nature of the beaches, the southern California coastline is very accessible to and heavily utilized by more than 15 million humans. Virtually all of the beaches are in public ownership and largely under the management of agencies with a human recreation mission. Thus, due to the high density of humans on southern California's beaches and beach park

maintenance practices, such as lifeguard vehicle patrols and trash raking, undisturbed areas for beach strand nesting birds, such as the snowy plover, are extremely scarce. In three areas where snowy plovers still nest on the beach strand, there are ongoing conflicts between the desires of beach recreationists and the survival needs of the snowy plover, Naval Air Station Pt. Mugu/Ormond Beach in Ventura County, Vandenberg Air Force Base in Santa Barbara County, and Silver Strand State Beach in San Diego County.

South of Ventura County, the majority of snowy plover nesting on beach strand that is relatively secure from human beach recreation activities, are within military lands devoted to military training missions, Marine Corps Base, Camp Pendleton, and the Naval Amphibious Base, Coronado, both in San Diego County. While occasionally in conflict with the military training mission, snowy plover breeding at these locations is adequately monitored and protected from predators, at this time. The recent presence around San Diego Bay of gull-billed tern, *Sterna nilotica vanrossemi*, an exceedingly rare, but unlisted species, poses a potential problem for snowy plovers nesting around San Diego Bay, such as those at Coronado. The gull-billed tern, which nests in low numbers in south San Diego Bay, has been observed preying upon snowy plover and least tern chicks but is so rare that lethal measures to prevent their preying upon listed species is currently discouraged. The situation is being monitored.

Smaller numbers of snowy plovers nest on beach strand managed by the Service at the mouth of Tijuana Estuary National Wildlife Refuge. International border security actions of the Immigration and Naturalization Service may be a factor in low snowy plover nesting south of this area. Even smaller numbers of snowy plovers nest on other Refuge lands around San Diego Bay that are not beach strand, but man-made areas, such as the saltworks dikes and D Street Fill. A Comprehensive Conservation Plan is currently in preparation for the South San Diego Bay Unit (saltworks) of the National Wildlife Refuge which should result in the identification and implementation of actions beneficial to snowy plover recovery.

The tidal restoration project at Batiquitos Lagoon in San Diego County, completed in 1996, included the construction of nesting areas suitable for snowy plover and least tern. During the wetland restoration construction, more than thirty acres of the lagoon bottom were built up with dredge material and topped with clean sand. These sandy, "beach-like" nesting areas, with tidally influenced edges, proved very attractive to snowy plover and least tern, with snowy plover nesting use increasing between 5 and 8 times the highest pre-project levels. A management endowment was also provided to a State agency to manage the Lagoon, including controlling undesirable weed growth on the nesting areas, predator management, and least tern and snowy plover nest monitoring. The Batiquitos Lagoon restoration project clearly established that such constructed nesting areas can be very attractive to snowy plover. Regrettably, incomplete protection from predators and inadequate control of weed growth has caused a decline in snowy plover use of Batiquitos to below pre-project levels in 2000. The State management authority is making some effort to reestablish the snowy plover nesting success at Batiquitos Lagoon.

The Environmental Impact Statement/Report for the San Dieguito Lagoon wetland restoration project in San Diego County has been completed and the project may be under construction by 2002. This restoration plan also includes the construction of several flat, sandy, built up areas

[illegible]at should be suitable for snowy plover and least tern. If successfully used by snowy plover, this project would be beneficial to snowy plover reproductive success.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

The Bolsa Chica Lowland Restoration Project has four general components:
1) the ocean inlet and bridges (inlet channel connects Cell 1 to the ocean);
2) 370-acre tidal basin (Cells 3-8, 15-18, 43, 44, 58-61);
3) the 240-acre muted tidal salt marsh areas (Cells 41-51, 53, 55, and 67); and
4) about 550 acres retained in its current condition (seasonal ponds and/or oilfield operations, Cells 2, 9-14, 19-40, inner and outer Bolsa Bay).

Also, there will be dredging only within a portion of the tidal basin and fill will be discharged to [illegible]construct the tidal basin containment berms, the "cordgrass" shelf, and the new nesting areas. [illegible]Construction staging areas and haul routes will also be necessary during construction. Water level management within the tidal basin will be required to dry it out enough to operate land-based equipment and construct the basin structure, then fill it with water to operate a hydraulic dredge. After project completion, both the tidal basin and the muted tidal areas will be continually inundated and exposed by tidal waters. The seasonal pond areas will require water level management, just as they do now, primarily to pump out excess water when water levels are too high.

None of the construction elements of the inlet, jetties, or bridges would have any direct or indirect affect upon breeding snowy plovers, due to the distance between likely nests and inlet location or highway improvements related to the bridge construction. Snowy plovers are commonly present on the beaches during the winter but would simply avoid the limited area of inlet construction activities in favor of the long stretches of less disturbed beach.

Similarly, none of the activities associated with the muted tidal areas would have any direct or indirect affect upon breeding snowy plovers, since they are not expected to use these areas before or after construction. However, if snowy plovers successfully nest on the one nesting area (#2) to be constructed in Cell 48, they would be benefit from this action.

The very large seasonal pond areas have virtually no construction activity proposed within them, although the existing road net may be used by moving heavy equipment, just as occurs now. The [illegible]wetland areas within the seasonal pond cells will remain available to nesting snowy plovers [illegible]hroughout construction and after. About two thirds of the total snowy plover nests during the

four years of Service study at Bolsa Chica occurred in these cells. Snowy plover nesting activity is expected to continue. Water level management, probably by pumping to lower the winter water levels, would continue to be used to protect the continuing oil field activities, as well as, to assure that extensive flats suitable for snowy plover nesting become exposed in a timely way. Predator management is expected to continue. Construction of the nesting area in Cell 14 (#3) would entail truck traffic along the existing road net and heavy equipment to spread and shape the nest site. Snowy plover nesting use of Cells 14 and 9 has been very low. Were there to be a snowy plover nest detected by the biological monitor in the vicinity of this nest site construction, no construction activity that may disturb the nest would be permitted while the nest were being incubated. Similarly, staging area 1, at the south edge of Cell 1 appears sufficiently distant from known and likely snowy plover nesting locations that no effect is expected. However, continual breeding season snowy plover monitoring and scrupulous oversight and control of the construction contractors activities in the seasonal ponds area will assure that no snowy plover breeding activity would be affected.

The "footprint" of the proposed tidal basin overlaps areas where about one third of the total snowy plover nests were found in the four years of Service study at Bolsa Chica, predominantly Cell 4. Consequently, whether by construction activities or inundation by tidal waters some of these areas would be rendered permanently unsuitable for snowy plover nesting. Tidal basin construction would begin with land-based equipment operating with and reshaping the tidal basin in a manner that is expected to preclude snowy plover nesting there. In the unlikely event that nesting snowy plovers were detected in the construction area, they would be protected in place with construction activities kept at sufficient distance to not affect the breeding birds. Later, to enable the hydraulic dredging, the tidal basin will have water in it, thereafter precluding snowy plover nests within the tidal basin. However, the southern half of the lowlands will remain available for snowy plover nesting, and the three new nesting areas will provide alternative upland areas which are not prone to flooding. It is apparent from Bolsa Chica, and elsewhere, that snowy plovers sometimes choose to nest in different places within the same general area, as with the banded female that nested in Cell 4, then 11, then 22 in 2000. It is reasonable to expect that snowy plovers that may have nested in Cell 4 may just as well nest in Cell 11 or a constructed nest site, should Cell 4 not be available.

The most simultaneously active nests at all of Bolsa Chica have been in the 8-12 range, dispersed over several cells, occasionally with nests within a few tens of meters of each other. In Cell 4, the range was between 5-9 nests each year and the average number of nests attempted was 7 nests spread over about 4 months of each year, such that only one to four nests were active at any one time. Assuming cells are not overly flooded, an abundance of suitable nesting area appears available in the south end of the lowlands that would accommodate the 1-4 nest attempts "displaced" away from Cell 4 by tidal basin construction. The construction of nesting areas suitable for snowy plover, as was successfully done at Batiquitos Lagoon, offers the additional benefit of providing nesting areas not prone to high water levels. As long as vegetation and predator controls are continued on the nesting areas, they offer good potential for contributing to snowy plover reproductive success above and beyond the seasonal ponds.

Also, during final design a choice could be made to preserve part of Cell 4 as seasonal pond, build the tidal basin berm around it, and forego constructing the upland nesting area #1 commensurately. To continue to be useful to nesting snowy plovers, water management (that is, pumping of seawater) would be required to keep this completely isolated cell from becoming permanently inundated. It would be below water surface elevation of the surrounding areas and have no drainage mechanism. The maintenance burden seems greater than those expected for the constructed nesting areas and the larger seasonal ponds area. Either way, it is not considered to make any significant difference to snowy plover reproductive capabilities.

The snowy plover broods tend to be reared in areas separate from other broods. Broods sometimes move between cells, but more typically stay within the cell where they hatched. When brood movements were observed between cells at Bolsa Chica, such moves apparently were not to disperse away from other broods, but may have been to move away from a predation threat or to move toward a food source. Thus, it appears that while relatively small areas are acceptable for multiple snowy plover nests, the broods need access to larger and separate areas from other snowy plover broods. On the other hand, there is no indication of crowding or of detrimental intraspecific competition at Bolsa Chica that would suggest that the available brood rearing capacity of the system is limiting.

Clearly, the single largest variable influencing snowy plover breeding success at Bolsa Chica, to date, is avian predation. Despite the relatively low density of breeding snowy plovers at existing Bolsa Chica, the relatively high and chronic presence of key predators can still significantly reduce snowy plover reproductive success. Low nest or brood density is not necessarily aiding the snowy plover to evade predation. Converting some formerly used snowy plover nesting and brood rearing areas to other habitats while retaining extensive snowy plover breeding areas in their current condition and adding constructed nesting areas would not significantly alter this situation. Predation pressure on snowy plovers is serious now and expected to continue after construction. Snowy plover nest monitoring and predator management will need to continue during and after construction to maintain snowy plover reproductive success.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

With the increasing human population in southern California has come pressure for more recreational opportunities and greater access to lands that were designated for protection of the snowy plover. Also, more urbanization may have contributed to population increases for certain species that prey upon snowy plover eggs or chicks, such as crows, kestrels, feral cats and dogs. Throughout southern California, predator management has become an increasingly important necessity for maintaining snowy plover reproductive success. The coyote, *Canis latrans*, is again present in the Bolsa Chica lowlands and may be responsible for the currently low density or

absence of small mammals that may prey upon snowy plover eggs or chicks, especially the non-native red fox, *Vulpes vulpes*. Public sentiment in urban areas sometimes disfavors the presence of coyotes, which if removed, could result in increases in snowy plover mammalian predators.

CONCLUSION

After reviewing the current status of the western snowy plover, the environmental baseline for the action area, the effects of the proposed Bolsa Chica Lowland Restoration Project, and the cumulative effects, it is the Service's biological opinion that the construction, as proposed, is not likely to jeopardize the continued existence of the western snowy plover. Critical habitat for this species has been designated elsewhere, however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The Fish and Wildlife Service and the Corps have a continuing duty to regulate the activity that is covered by this incidental take statement.

AMOUNT OR EXTENT OF TAKE

The Service does not anticipate the proposed action will incidentally take any western snowy plovers.

EFFECT OF THE TAKE

If, during the course of the action, incidental take occurs, such incidental take represents new information requiring reinitiation of consultation and formulation of reasonable and prudent measures. The Service and the Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible formulation of reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information.

1. The Service could publish the draft Western Snowy Plover Recovery Plan for public review and comment.

2. The Service and the Corps could annually monitor or coordinate monitoring and banding of snowy plover breeding populations throughout southern California.

3. The Service and the Corps could promote the establishment of fenced or restricted access impoundments on public beaches such that natural beach strand vegetation could persist and snowy plovers may nest undisturbed.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the Bolsa Chica Lowland Restoration Project activities described in the EIS/R and referenced in the Corps April 12, 2001 letter. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. If you have any questions or concerns about this biological opinion, please contact Mr. Jack Fancher of my staff at (760) 431-9440.

Sincerely,

Andrew R. Yuen

Jim A. Bartel
Acting Field Supervisor

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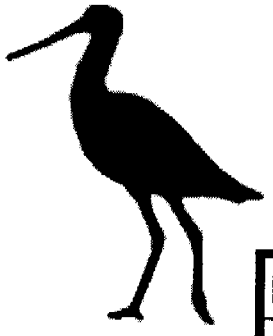
SIMON

Bolsa Chica Lowland Restoration Project

Biological Monitoring and Followup Plan

Fish and Wildlife Service
November 2001



INTRODUCTION

The Bolsa Chica restoration project is similar in type (tidal restoration) and dimension to the Batiquitos Lagoon restoration which was completed in 1996 and has an ongoing 10-year biological monitoring program. Biological monitoring at Bolsa Chica will be conducted in a manner similar, but not identical, to the Batiquitos Lagoon monitoring. The Bolsa Chica monitoring plan has dropped some sampling methods and reduced the number of sampling locations based upon an evaluation of the results of the Batiquitos Lagoon monitoring and the reduced physical complexity of the Bolsa Chica restoration area when compared to Batiquitos Lagoon.

The purpose of the Bolsa Chica wetlands long-term ecological monitoring program is to document the habitat improvements for fish and wildlife, the success of revegetation efforts, and the use of the site by endangered species. In addition, there are several specific monitoring programs to insure that the restoration is built according to the approved plans, the inlet is properly maintained, that constructed nesting areas have adequate maintenance, that any impacts to sensitive plant species are offset, and that construction impacts to Belding's savannah sparrow are minimized.

The ecological monitoring objectives are:

- Facilitate evaluation of the effectiveness of the restoration to provide habitat for fish and wildlife;
- Document changes in the ecology of the wetlands environment over time;
- Provide timely identification of any problems with the physical, or biological development of the restored area;
- Assist in providing a technical basis for resource management of the restored wetland by documenting maintenance needs and enhancement opportunities.

Some parts of this plan may be subject to a Request for Proposal process for consultant services with a negotiated contract and scope of work to be established following completion of construction. However, the agency which assumes long-term management and maintenance responsibility may elect to implement this plan employing its own experts and institutional expertise. The Batiquitos Lagoon plan was approved by the California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers (COE), Environmental Protection Agency (EPA) and California Coastal Commission (CCC). This Bolsa Chica monitoring program, which has the concurrence of the above Bolsa Chica Lowland Restoration Project Steering Committee agencies, is provided to CCC as part of our project proposal in support of our commitment to the public to execute the best possible restoration project.

The program will emphasize monitoring the biological elements of the lagoon. Some physical elements will be monitored to provide supporting information for the biological assessments. Sampling programs are designed to document the condition of vegetation, benthos, fish, birds, and special status species as well as the state of the physical environment on which they depend.

Biological monitoring will be conducted during the 2nd, 5th, and 10th years after completion of construction. Listed species will be monitored each year. Biological sampling will be conducted at fixed intervals as specified in this program. The reasons for the various sampling frequencies are explained in the discussions of individual program elements.

Sampling along permanent transects established at strategic locations will support multiple monitoring elements. To the extent possible, physical and biological variables will be measured at the same general location in order to suggest causal relationships among the variables. The information will be summarized in an annual report prepared by the responsible agency for the regulatory agencies (COE and CCC), as well as the other proponent agencies (NMFS, CDFG, SLC, Coastal Conservancy, USFWS, and EPA).

This monitoring program was prepared in consultation with state and federal regulatory agencies responsible for maintaining, protecting, and enhancing natural resources (CDFG, NMFS, and USFWS). The program is consistent with agency guidelines for environmental monitoring..

ECOLOGICAL MONITORING

WATER QUALITY

The water quality in Bolsa Chica full tidal basin will influence the timing and course of biological developments after project construction (e.g., plant colonization,, fish utilization, benthic colonization). Data on water quality will be taken quarterly at the two locations sampled for benthos and fish. Water quality parameters will be monitored continuously at a location in the north end of the tidal basin for 30-days during the same period as fish sampling. Water quality monitoring will be continuously conducted at one station in the muted tidal area during year 2. If poor water quality conditions are noted, more intensive sampling may be employed to determine the extent and duration of these conditions.

Dissolved oxygen, temperature, chlorophyll a, and conductivity will be measured with a Hydrolab Surveyor, or equivalent, and turbidity will be recorded with a Seatech transmissometer, or equivalent. At each site, measurements will be made at the surface, mid-depth, and near bottom in the channel and also at surface and near bottom over the shallow subtidal during high tide and low tide to characterize the environmental extremes of the lagoon.

The results of quarterly water quality surveys will be summarized and presented in a form that allows comparisons of locations and over time. The results can also be used in multivariate correlations of environmental conditions with biological parameters.

SOILS

Soil and sediment conditions in the lagoon might be changed in the course of dredging and by the influence of tidal flushing. A knowledge of soil conditions will help determine which factors might be controlling plant community diversity and productivity and which types of plant communities arc likely to develop in the future.

Soil (sediment) samples will be taken at the time of vegetative sampling along each of the three vegetation transects within the elevational range where vegetation is expected to colonize. Within the elevational ranges for different expected floral assemblages along the transect, three randomly selected locations will be sampled. Soil texture and organic content samples will be collected with a near-surface coring device of at least 100 gram capacity. Salinity/conductivity and pH samples will be taken at depths of 5 centimeters and 15 centimeters with a 12-cubic centimeter syringe that is open at the distal end. These are routine sampling procedures used in contemporary studies of West Coast wetlands. The analyses of soil texture, organic content, salinity/conductivity, and pH will be conducted by using standard laboratory (ASTM) procedures.

VEGETATION

The composition and extent of vegetation will be documented by transect sampling and aerial photography. Aerial photography will record wide-scale patterns of plant community distribution. Transect sampling will provide data on species composition with elevation and on cover of plant communities. Over time, these combined techniques should reveal the pattern of lagoon revegetation following construction.

A minimum of three replicate permanent transects will be established in each of habitats (cordgrass, Rabbit Island intertidal, muted tidal pickleweed, and full tidal pickleweed) and will span the elevational range encompassing the possible growth of marsh plants (3.5 feet MLLW to extreme high tide level). Elevations along the transects will be surveyed during the first year (to $\forall$ 0.1 foot) and referenced to a local benchmark. Each transect will be designated with poles located along its length. The transects will be located in areas that represent zones where coastal salt marsh vegetation is expected to respond to the predicted tidal regime.

Before and during construction, two vegetation transects in the proposed muted tidal area will also be examined twice, during spring and early summer, for the purpose of documenting the interim water management measures there. The interim water management in the muted tidal area will be conducted to assure that Belding's savannah sparrows that may be displaced from

the tidal basin during construction will have optimal nesting conditions in the muted tidal area, but before the muted tidal influence is functioning. This sampling will start with the first breeding season following final approval of the project plan (e.g. spring of 2002). Soil saturation, measures of pickleweed growth, other plant species will be determined along these transects. Two transects in pickleweed of Inner Bolsa Bay will be examined in the same manner and time, to allow comparison of conditions.

Species composition and percent cover will be determined by the point-intercept method using a sample quadrat of appropriate area. A stratified random sampling design will be used. Within uniform intervals along each transect, 10 replicate samples will be taken at randomly determined points within 5 meters on either side of the transect. Equivalent sampling designs that yield the same total replication within each habitat type may be used. The intercept frame will be placed on the ground, and plants hit by pins in the frame (or equivalent points) will be identified to species. The sampling area will also be photographed with the frame in place to provide a permanent record. Within appropriate habitats, height measurements will also be taken of a random sample of *Spartina* and *Salicornia* plants. In addition, all plant species present within a 1-meter swath on either side of the transect will be recorded.

Reintroduction of eelgrass, *Zostera marina*, and cordgrass, *Spartina foliosa*, into the completed full tidal basin will occur, in order to begin establishment of these high habitat value coastal wetland species. The intended reintroduction method for cordgrass would be that successfully employed by the Corps of Engineers at Newport Slough. For eelgrass, the method used for eelgrass reintroduction at Batiquitos Lagoon or Talbert Marsh would be used at Bolsa Chica. Additional, more frequent monitoring of pilot planting areas for cordgrass and eelgrass following planting will occur. The contractor responsible for the revegetation component of the enhancement effort will have responsibility for meeting survival criteria for one year following transplantation. The long-term monitoring program will determine, document, and report on the location and size of the stands of these reintroduced plants. At representative locations, vegetative cover will be estimated for both species and turion density will be estimated for eelgrass. These surveys, as well as the fish sampling, would also aid in the early detection of highly undesirable, aquatic, invasive species, such as *Caulerpa taxifolia*, the notorious "killer algae".

The establishment of new acreage of coastal salt marsh will be determined in the aerial photographic analysis. Aerial photographs will be taken during each monitoring year during early summer (May and June). This is when wetland habitat can best be delineated because it remains green while upland vegetation has begun to senesce and turn brown. The photographs will be taken at as low a tide as possible given a high sun angle. False-color infrared photographs will be produced at a scale of 1:4800. Aerial photography will be done at the same time as transect sampling so that transect data can provide ground truth.
Based on the aerial photograph, a vegetation map will be prepared at 1:300 scale. The map will cover all vegetated areas within the full tidal basin. Vegetative communities will be mapped using the Holland classification system developed by the CDFG. Acreage of each habitat type will be determined.

Other observations that will be recorded during the yearly survey include:

- Invasion by any non-native species considered to be nuisance or pest species such as giant reed or pampas grass;
- Die-offs of native vegetative communities that might be attributed to disease, anomalous oceanographic conditions, or insect damage;
- Shifts in species abundance, such as replacement of coastal salt marsh by freshwater species or the presence of new species such as increases in cordgrass or eelgrass;
- General growth and expansion patterns in the vegetative transplant areas.

FISH

A variety of sampling methods will be used to determine the abundance and composition of burrowing, demersal, and pelagic fish assemblages in the lagoon. The approach is based on agency-approved monitoring programs for wetlands enhancement projects at Upper Newport Bay, Anaheim Bay, and Batiquitos Lagoon.

Fish will be sampled quarterly at high tide during specified monitoring years at two sites in the Bolsa Chica full tidal basin. Samples will be collected from slope and subtidal areas at opposite ends of the tidal basin by using otter trawls, or bag seines, as appropriate, and enclosures in the muted tidal area. Other sampling methods, such as gill nets may be employed during the monitoring, as needed, to document specific subgroups of lagoon fish. The sampling locations will be selected after construction plans are final, but they are expected to be near two of the benthos sampling sites discussed below. Sampling will begin one year after completion of construction (beginning of year 2) to characterize post-construction conditions. The fish surveys will be conducted between mid- and high tide during daylight hours.

Demersal fish, including juvenile California halibut, will be collected by otter trawl. A 3.8-meter otter trawl with 2.0-centimeter mesh in the wings and 0.8-centimeter mesh in the cod end will be towed by a small boat along the mid-channel area at each station. Two replicate 5-minute otter trawls will be made during each survey. Differential GPS will be used to measure the lenth of the trawl area so that catch densities can be calculated.

A bag seine (15.2 meters x 1.8 meters with 0.3-centimeter mesh net in the bag and 0.6-centimeter mesh in the wings) will be used to capture large and small demersal and pelagic fish. This device is particularly effective for sampling nearshore schooling fish (the type the California least tern feeds on). Two replicate hauls covering approximately 220 in^2 each would be made at each station. The bag seine will be set parallel to shore at a depth of 1.8 meters and hauled to shore by hand or winch.

A square enclosure (1 meter x 1 meter x 1 meter) will be used to sample burrow-inhabiting fishes, especially gobies, in the muted tidal area. The square enclosure is made of heavy duck material fastened to a frame of 2.5-centimeter PVC pipe. The enclosure is set on the bottom in 1

meter of water at three randomly chosen positions at each station and spiked with rotenone or quinaldine to kill or immobilize the fish. Fish are collected from the interior of the enclosure by thorough search for 10 minutes with a 1 millimeter mesh, long-handled dip net.

A gill net may be used to catch large, fast-moving pelagic fish. At each station, a mixed-panel monofilarnent gill net would be placed in the channel perpendicular to the axis of tidal flow for one hour. The monofilament gill net would be 45.6 meters x 2.4 meters with six panels (two panels with 1.3- to 2.5-centimeter mesh, two panels with 2.5- to 5.1-centimeter mesh, and two panels with 6.4 to 7.6-centimeter mesh). Because gill nets could also capture diving ducks and other waterfowl, use of this fish-sampling method would be kept to a minimum and attended while in place.

Samples will be processed in the field to the extent possible. All fish (or subsamples of large catches) will be counted, measured, and weighed, then returned, if alive, to the water unless identification to species is not possible. Subsampling, when necessary, will follow standard procedures for each sampling technique. Fish samples not measured in the field will be preserved in 10 percent formalin and returned to a laboratory for analysis.

The fish catches will be expressed as fish per square meter for trawl and seine results. Parametric statistics will be used to summarize abundance, size, and biomass of fish populations and to describe differences over time. The establishment and recovery of the fish community will be well described and quantified and will be comparable to the similar work done at other completed restoration projects, such as Anaheim Bay and Batiquitos Lagoon.

BENTHOS

The objective of benthos monitoring is to characterize the marine invertebrate food resources for birds and for fish, including those of recreational or commercial importance (e.g. California halibut). The results will also provide an index of general habitat quality.

Benthic invertebrates will be sampled twice each year, in December/January and June/July. This schedule will encompass the extremes of seasonal variation for benthic communities and will document food availability for winter migrating birds and summer fish communities. Benthic samples will be taken near the two locations sampled for fish (one near the inlet end of the tidal basin, one in the north or closed end of the tidal basin) andn at one nearby vegetated area at the closed end of the tidal basin. The benthic survey will be conducted during low tide to facilitate collection of intertidal and subtidal samples.

Infaunal samples will be collected with a hand-operated corer 15 centimeters in diameter by 10 centimeters deep (approximately 1.5-liter volume). At each station, three core samples will be collected in the intertidal zone (approximately 2 to 4 feet MLLW), and an equal number will be collected in the subtidal zone (below -1.6 feet MLLW). Cores will be collected within 10 meters of the designated sampling station. A random number table will be used to select the six

locations (direction and then distance along the radius) for core samples within each tidal zone. In order to reduce within-zone variability, each sample may be a composite of several cores. A subsample (100-gram capacity) will be taken from each core or composite and washed through a 0.5-millimeter screen. The remaining portion of each sample will be washed through a 1.0-millimeter screen. Both portions will be preserved in seawater-formalin for subsequent taxonomic and biomass analysis.

Macrobenthic organisms living on the sediment surface (for example, the California hornsnail *Cerithidea calfornica* and grapsid crabs) are not effectively sampled by cores. Relatively sedentary epifauna will be censused visually by counting animals within randomly-placed quadrats. Six replicate quadrats will be censused at each station. The size of the quadrat will be appropriate to the abundances of the species present. The more motile epeifauna will be counted in belt transects. Representative subsamples of epifauna in the quadrats will be collected for biomass determination.

Infauna retained by the 1.0-millimeter screen will be sorted into major faunal groups (crustacea, polychaetes, oligochaetes, molluscs, echinoderms, insects, and others) and weighed to determine wet-weight biomass. This level of taxonomic discrimination is sufficient to establish the food resource for birds and bottom-feeding fish. The total food resource represented by infauna in each basin will be calculated on the basis of the densities in the core samples. The subsample of organisms retained by the 0.5-millimeter screen will also be identified and weighed to establish the proportion of infaunal biomass made up by smaller organisms. All samples will be archived, however, and will be available for more detailed evaluation in the future. Epifaunal invertebrates will be identified to species, and their abundance will be expressed as estimated number per square meter. Parametric statistics will be used to summarize the abundance and biomass of major infaunal groups and to describe differences over time. The establishment and recovery of the benthic invertebrate community would be well described and quantified and be comparable to the similar work done at other completed restoration projects, such as Anaheim Bay and Batiquitos Lagoon.

BIRDS

Counts of all birds throughout the Bolsa Chica lowland will be conducted monthly throughout each monitoring year. The survey will involve systematic coverage of the lowland during daylight hours. As a way of partitioning the data base into manageable units, previous surveys divided Bolsa Chica into study subareas (Cell numbers). Surveying the study areas standardizes the coverage and allows for direct comparisons of avifauna within each study area on each survey date. This same procedure will be followed in the long-term monitoring program to ensure compatibility of data, with appropriate modification of the cell numbering system where cell features have been removed by construction of the tidal basin. In addition, each study area

will be divided into habitat types. These types will correspond to the habitat types described in this Final EIR/EIS and those used in the vegetation mapping.

The avifauna of the wetland system will be counted over a tidal cycle during each observational period. Several surveyors, experienced ornithologists equipped with spotting scopes, binoculars, field guides, and data entry forms, will systematically survey the study areas. All birds seen or heard will be counted, and the activity (feeding, resting, flying, courting) will be recorded along with the habitat being used. Wind speed and cloud cover will be noted periodically during the survey (surveys will be canceled if wind speed exceeds approximately 10 knots because the effect of strong wind on bird behavior would make the resultant data not comparable with the other surveys). Each observational period will be conducted over a tidal cycle (or approximately 6 hours) and will be conducted from low to high tide. During the survey, staff gauge readings will be recorded at hourly intervals to relate to habitat distribution.

The data from each survey will be used to describe the composition of the bird community by habitat and through time. Each year of data will be compared with other years and with data from other coastal wetlands, as available. Avifaunal abundance will be summarized by habitat type, activity patterns will be described, and use of the Bolsa Chica wetlands by key groups of birds (herons/egrets, raptors, dabbling ducks, shorebirds, grebes and diving ducks; and gulls, terns, and skimmers) will be discussed.

Data analysis will evaluate differences in population density among habitats in the lagoon, between Bolsa Chica and other coastal wetlands, and at Bolsa Chica over time. The comparisons will be supported by basic parametric techniques such as t-tests.

SPECIES OF SPECIAL CONCERN

Biological monitoring for nesting listed Threatened or Endangered species will be conducted annually, not just during years 2, 5, and 10. The monitoring method will be the same as has been developed for each species pursuant to a statewide monitoring program or the same method as has been conducted at Bolsa Chica for several years pre-project. The purpose of this monitoring is primarily to assess reproductive success and/or problems, and to determine the adequacy or need for management actions.

The special-status species in Batiquitos Lagoon that will be monitored each year are the Federal and State listed Endangered California least tern (*Sterna antillarum browni*) and light-footed clapper rail (*Rallus longirostris levipes*), Federal Threatened western snowy plover (*Charadrius alexandrinus nivosus*), and the State Endangered Belding□s savannah sparrow (*Passerculus sandwichensis beldingi*). These listed species will receive special attention because they have long histories of breeding at Bolsa Chica or, as in the case of the clapper rail, are expected to eventually breed there. The breeding conditions for the least tern at Bolsa Chica will be improved by the large expansion of nesting sites, since they are currently crowded by larger, denser nesting birds, such as Caspian tern, elegant tern, and black skimmer, on the small existing

islands. The constructed nesting areas will also benefit western snowy plover as they can use similar nesting areas as the least tern, and these nesting areas will be available even in severely wet years when the unvegetated flats of the seasonal pond area are under water. Reintroduction of tidal conditions for cordgrass will eventually create breeding conditions for the highly endangered clapper rail.

A Statewide breeding census of the least tern has been conducted annually under the guidance of CDFG and USFWS. Least tern breeding site monitoring is somewhat standardized: nesting colony inspections of nests and tern breeding activity twice a week between middle April to late August, by a qualified permitted monitor. Additional observations may be made from a suitable distance outside the nesting colony to avoid disturbance. Other pertinent observations will also be made (e.g., evidence of disturbance by humans, predators, other nesting birds). This census program, at a minimum, determines the breeding population at the site, number of nests, and number of fledglings, or breeding success, each year during and after project construction.

Monitoring of western snowy plover breeding activity at Bolsa Chica has been conducted by USFWS for 5 years pre-project in accordance with methods described in the reports. This survey method would continue during and after project construction. This survey method determines the snowy plover breeding population, number of nests, number of chicks and fledglings produced. Snowy plovers and least terns may nest together on the constructed nesting areas, as happened at Batiquitos Lagoon. Such nesting activity by least tern or snowy plover during construction will be protected from harm by maintaining an appropriate buffer between the nesting location and construction activity.

The clapper rail is not expected to breed at Bolsa Chica until the cordgrass reintroduction has been successful. However, its presence will still be sought in accordance with the annual census that has been conducted for many years.

Counts and observations of Belding□s savannah sparrows will be completed each year during and post-project with the same methods as have been used at Bolsa Chica for many years. Field observations will concentrate on high coastal salt marsh pickleweed communities. A walk-through survey will be conducted annually between early April through July. Singing males, resting females, and other evidence of breeding or breeding territories will be mapped. Other pertinent observations will also be recorded.

PERFORMANCE MONITORING

"Built-to-Plan Monitoring"

The restoration plan for Bolsa Chica calls for dredging to create a subtidal area (about 175 acres) within a larger tidal basin (360 acres) and construction of nesting areas, reintroduction of

eelgrass, cordgrass. Existing low-lying habitats will be restored to tidal action by creation of a new ocean inlet and a large tidal prism (converting seasonal flats and nontidal picklweed into about 172 acres of intertidal mudflats and salt marsh habitats). Therefore, the main post-project "built-to-plan" survey at the end of construction will be a bathymetry survey. There will also be a survey of the constructed nesting areas and cordgrass habitat to insure that elevations and configurations are as planned. The design criteria are the performance standards. The tidal basin bottom will be surveyed following construction to verify that design criteria (e.g., channel dimensions, side slopes, nesting site locations) have been achieved. This survey will be conducted by an independent contractor (not the construction contractor) under the guidance of the responsible agency. If the performance standards are not met the construction contractor will be responsible for remediation in order to meet those standards.

INLET MONITORING AND MAINTENANCE

Bathymetry

The results of this survey will describe starting-point conditions. Changes in bathymetry inside the inlet, in the area of the flood shoal formation, can detrimentally influence the performance of the habitat restoration. (Flood shoal enlargement can mute the low end of the tidal range such that intertidal mudflat or low elevation salt marsh habitats are eliminated.) The information gathered is intended to be sufficient to detect the onset of significant alteration of the tidal regime in the basin and the concomitant need for maintenance dredging. The bathymetric monitoring during the first 10 years is designed to evaluate the predicted maintenance dredging schedules.

Absolute horizontal and vertical elevations will be established to accuracies of $\forall$ 0.1 foot referenced to U.S. Coast and Geodetic survey marker controls or other agency controls that will be referred back to the U.S. Coast and Geodetic survey markers. All work will be performed in accordance with professional hydrographic survey and profiling practices. Subsequent, long-term bathymetric monitoring may be conducted on a schedule that reflects the likelihood of significant bathymetric change in the flood shoal management area.

For the flood shoal area, bathymetric monitoring will be conducted twice annually in years 1, 2, and 3, and once each during years 5 and 10. Because the consequences of inlet stricture or closure can have significant effects on the habitat in the lagoon, this monitoring schedule is intensive just after lagoon construction to provide an assessment of flood delta formation rates. The surveys will be conducted from a small boat equipped with a survey-quality fathometer and a positioning system, or by wading surveys at low tide, or by using a combination of both, or by other techniques that will provide the vertical and horizontal accuracy required.

Profile plots will be produced for each survey. Cross sectional plots of flood shoal profiles from each survey will be compared to the post-construction bathymetry map.

Tidal Monitoring

Information on water levels in the lagoon will be used in conjunction with bathymetric data to evaluate and to make management decisions such as the need for maintenance dredging. The tidal monitoring will be conducted continuously in years 1 through 3 and during years 5 and 10. Water levels will be recorded by tide gauges located in the flood shoal maintenance area. The gauges will be placed away from the inlet channel to provide representative measurements. Tide gauges will be left in place to cover neap, mean, and spring tidal conditions and determine seasonal variations and affect of specific storm events.

Tidal curves will be generated from tide gauge data for each survey, and the information will be summarized for each period. Water level variations over time will be correlated with bathymetric data to correlate with desired habitat acreage and to determine if the tidal ebb and flow is impeded or inlet blockage is indicated. A tidal muting of the average low tide elevations (Mean Low Water) in the order of 0.5 feet would indicate that the flood shoal maintenance dredging was warranted.

Inlet Maintenance

Flood shoal maintenance dredging is essential to maintaining the habitat distribution of the restored tidal basin. If the flood shoal were allowed to enlarge to the point where the inlet ceased to function, the tidal habitats within the tidal basin would become severely degraded, because the moderating and invigorating influence of the ocean waters would be curtailed. In the extreme, anoxic conditions (oxygen depletion and overheating) could cause the death of most aquatic organisms trapped inside a closed tidal basin. The restored wetland must not be allowed to close. Sand accumulation in the flood shoal can begin to mute the full tidal range before there is the threat of closure.
The tidal hydraulic modeling done during preliminary engineering indicates that flood shoal maintenance dredging would occur approximately every two years and is a necessary aspect of maintaining the flow of sand along the beach outside the inlet. Using the flood shoal bathymetric and tidal monitoring results will allow an adaptive management of the flood shoal dredging. Thus, the flood shoal may be dredged in order to place the sand out on a section of beach that the beach monitoring indicates is in need of the sand. The flood shoal may be dredged if the tidal regime inside the tidal basin becomes significantly impaired. If neither of these "triggers" is applicable, the flood shoal maintenance dredging interval may be extended until one or the other of them does apply.

MONITORING AND MAINTENANCE OF CONSTRUCTED NESTING AREAS

The three new constructed nesting areas (and the two existing small islands in the State Ecological Reserve) will require annual evaluation of the surfaces in order to determine whether they remain optimal for nesting snowy plovers and least terns. To provide a site attractive to nesting Least Terns, the site should be relatively free of vegetation prior to the breeding season.

All nesting sites should be inspected in January. If vegetation coverage exceeds 5%, vegetation must be removed. The presence of some low profile native vegetation that provides cover for chicks is acceptable. The amount of effort required to remove vegetation will depend on the extent of coverage. Removal of excess vegetation would be carried out by scraping, dragging, hand weeding, and sometimes appropriate herbicides, before middle March, when plover nesting begins.

In the seasonal pond area, snowy plovers nest on the flats once the accumulated winter rainfall has evaporated or drained away. Management of water levels in the seasonal pond area by pumping or water control culverts may be necessary in some years to assure that unvegetated flats are available for snowy plover nesting of the lowland. Controlled access and regular maintenance of the security fences, to preclude the damaging influence of human trespass, but especially feral cats and dogs, are also essential.

During breeding season for these birds, regular surveillance for predation losses or other disturbances to these sensitive species is essential and will be conducted. Predator management (to guard against listed species breeding failure) has been conducted by USFWS and/or CDFG at Bolsa Chica for years, and will continue. At Bolsa Chica, the principle predators of the listed species, particularly terns and plovers, have been other birds, such as crows and American kestrel. Qualified predator management specialists will conduct appropriate predator removal activities in coordination with the site manager/monitor.

ENHANCEMENT OF BELDING'S SAVANNAH SPARROW HABITAT

The regular state-wide censusing of breeding Belding's savannah sparrow indicates that salt marsh areas with full or muted tidal influence, such as Mugu Lagoon, Anaheim Bay, Upper Newport Bay, Sweetwater Marsh, and Tijuana Slough support more breeding pairs than non-tidal salt marsh areas, such as Bolsa Chica. Also, while the pre-project data is weaker than the after-project data, Belding's savannah sparrow was apparently benefitted by the 1978 muted tidal restoration of Inner Bolsa Chica. At any rate, the restoration of muted tidal influence to the proposed muted tidal area of Bolsa Chica is intended to mimic the results obtained by the muted tidal restoration of Inner Bolsa Chica, invigorating the existing pickleweed and the associated salt marsh/aquatic community.

During the three years of project construction and, thus, before tidal influence could be restored, Belding's savannah sparrow would be incrementally and permanently displaced from parts of the construction areas of the tidal basin. It is probably that many of these birds will relocate to available suboptimal pickleweed habitats. However, in order to increase the likelihood that displaced breeding birds have a suitable place to which to relocate, interim water management will be conducted in the future muted tidal area. This interim water management will begin the first season following final approval for the project, that is Spring of 2002. Impacts from grading

activities to existing pickleweed in the full tidal area are expected to begin in late winter of 2003, but flooding necessary for hydraulic dredging are not expected to occur until September of 2003.

Currently, during wet years, the oil company pumps water out of Bolsa Chica to maintain safe access to the operating oil wells. The primary goal of interim management of water levels in the future muted tidal area is to increase the value of nontidal pickleweed for Belding's savannah sparrow by mimicing Inner Bolsa Bay pickleweed habitats, but without actual tidal influence. Water level manipulation will be adjusted to create similar patterns of soil saturation and pickleweed habitat in the future muted tidal area. In order to control the water level within the future muted tidal area during this interim water management period, closure of selected culverts to prevent drainage from the cells may be necessary. Water management will consist of pumping or draining accumulated rainfall out of some cells if water levels are judged by the biologist to be too high. During dry periods, seawater will be pumped into these areas.

This water management would be conducted by a contractor working at the direction of the USFWS project manager and biologist and be continued throughout the construction period. Once the construction is complete and the muted tidal area is connected to the tidal basin, the regular but muted ebb and flow of the tides will enhance this pickleweed dominated area for nesting Belding's savannah sparrow, and pumping would not be necessary.

The above mentioned vegetation transects within the proposed muted tidal area and Inner Bolsa Bay, observed during this interim water management period, along with the censusing of Belding's savannah sparrow breeding activity, will be used to help modulate the water management action to the best benefit of this species. (Also, inadvertent creation of a mosquito production area would be avoided.) An adaptive management approach to interim water management is intended and this interim water management may begin as soon as final project approvals are obtained, to allow for some habitat improvements before construction must be initiated in the full tidal basin.

SENSITIVE PLANTS

Coastal woolyheads, *Nemacaulis denudata* var. *denudata*, a rare, annual, dune plant, continues to survive in a few tens of square feet on Rabbit Island and in remnant dunes next to the Pacific Coast Highway and the CDFG loop trail. USFWS surveyed the project area for this plant in 1997 and again in 2001. Nonnative iceplant now carpets much of Rabbit Island and has already excluded woolyheads from those areas which would become intertidal salt marsh after completion of the project. Without any action, woolyheads will have been completely eradicated from the project area by iceplant encroachment. Therefore, measures to enhance woolyheads within the project area should be viewed as enhancement, rather than mitigation. It is intended that iceplant will need to be removed from the higher elevations of Rabbit Island to restore conditions appropriate for the reseeding of woolyheads. Seed collection from extant plants onsite and reintroduction to the sandy areas where iceplant has been removed is the expected method. Other methods, such as greenhouse cultivation and seed harvesting, would only be considered if necessary. Establishment of woolyheads in a native dune plant community on the

non-tidal portion of Rabbit Island would enhance conditions for this rare plant. This effort would span several years and would be overseen by a qualified botanist.

COMMITMENTS TO PERFORM

Those above commitments that apply before and during construction will be implemented by the Fish and Wildlife Service, using project funds allocated to construction. When construction is nearly complete, the long-term management agency will be identified (USFWS, CDFG, or acceptable third party). That entity will assume long-term responsibility for implementation and performance pursuant to this plan, particularly flood shoal maintenance and breeding habitats for listed species, particularly the least tern, snowy plover, and Belding's savannah sparrow. A maintenance endowment (currently amounting to $6.3 million) was established when the project began in 1997 and will be primarily used to conduct the flood shoal maintenance dredging.