

SAN DIEGO BAY  
ADVISORY COMMITTEE  
FOR ECOLOGICAL  
ASSESSMENT

FINAL REPORT

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## Executive Summary

Senate Bill 68 (Alpert), signed into law in 2003, directed the creation of the San Diego Bay Advisory Committee for Ecological Assessment (Committee) to conduct an independent assessment of conditions and trends in the Bay's health and to issue a report (SB 68 Report) to the legislature and various other entities. The purpose of the evaluation was to aide in making comprehensive decisions about future proposals to improve habitat and species diversity, as well as to implement water quality standards in a fair and equitable manner to ensure full protection of all beneficial uses of the Bay.

This SB 68 Report relies heavily on several key pieces of data. The 2000 San Diego Bay Integrated Natural Resources Management Plan (INRMP) was used as the basis for the analysis and findings related to habitat, species abundance and diversity of species. The INRMP is a comprehensive evaluation of the natural resources of San Diego Bay, prepared jointly by the U.S. Navy and the Port of San Diego, and is updated regularly. The SB 68 Report also used information compiled by the Southern California Coastal Water Research Project as a part of their Southern California Bight Project, which compiles sediment, water and tissue data from areas throughout Southern California every five years.

The SB 68 Report contains 37 findings, assembled in four categories: Health of The Bay; Natural Resource Enhancement; Stormwater Management; and Other Findings. Health of the Bay addresses habitats, species abundance and diversity, and water and sediment quality. Natural Resource Enhancement focuses on constraints to the implementation of the INRMP. Stormwater Management focuses solely on the industrial stormwater permit. This permit applies to the shipyards and boatyards and is the only stormwater permit that contains toxicity standards. Other Findings summarizes gaps in regulation and data, as well as additional efforts that are necessary to achieve a healthy bay.

In addition to its findings, the SB 68 Report also makes three recommendations by Committee consensus. Chief among these is the support for the creation of a partnership to facilitate cross-jurisdictional implementation efforts. Such a partnership would allow the work of the Committee to continue by fostering collaboration in achieving a healthy bay, seeking resources, and working toward consensus on various issues contained both in this Report and in the INRMP. In addition to the partnership, the Committee also recommends that several important habitat enhancement projects identified in the INRMP be evaluated through their ongoing INRMP efforts, or by the partnership, if it is created. Finally, the Committee recognizes the need to develop and implement a Biological Indicator Program to better understand the link between the diversity and abundance of various species in the Bay and indicators of water and sediment quality.

## 1. Introduction

There are few places where the rich diversity and abundance of a harbor's natural resources and human socio-economic activities coexist so closely as in San Diego Bay. Here, natural resources, the commercial economy, recreational uses, and strategic military uses overlay each other and underpin each other's viability. The diversity of interests in San Diego Bay makes it essential to fully understand its complex ecosystem. By doing so, informed decisions and strategic investments in the Bay's future can be made.

Senate Bill 68 (Alpert), signed into law in 2003, directed the creation of the San Diego Bay Advisory Committee for Ecological Assessment. The intent of the legislation was to 1) support an independent assessment of conditions and trends in the Bay's health for the purpose of making comprehensive decisions about future proposals to improve habitat and species diversity, and 2) implement water quality standards and objectives in a fair and equitable manner to ensure full protection of all beneficial uses of the Bay. The legislation also directed the development of a report to provide information on:

- Historic data and trends in indicators of Bay health such as pollutant levels and number and diversity of species;
- Habitat enhancement projects proposed in the San Diego Bay Integrated Natural Resources Management Plan (INRMP); and
- The best available and economically practical technology to meet stormwater toxicity standards.

The bill required the Committee to prepare and submit this report to the California legislature, the San Diego Regional Water Quality Control Board, the State Water Resources Control Board and the California Coastal Commission, on or before December 31, 2005.

## **2. The Report**

The San Diego Bay Advisory Committee For Ecological Assessment (Committee) was assembled in 2004 and has met monthly since then. The Committee met as three subcommittees – Health of The Bay, Natural Resources/Habitat, and Stormwater – based upon the direction of the implementing legislation. The Final Report is presented in the same format, with the addition of a fourth section containing other findings and recommendations.

The work of the Committee, as well as the content of this report, is built upon certain key studies that preceded it.

### **San Diego Bay Integrated Natural Resources Management Plan (2000)**

The San Diego Bay Integrated Natural Resources Management Plan provided important information for evaluating issues related to habitat, as well as species abundance and diversity. This plan, developed by the U.S. Navy and San Diego Unified Port District (Port) with input from State and Federal regulatory and resource agencies, is a long-term strategy which emphasizes the interconnections among all of the natural resources and human uses of the Bay, across ownership and jurisdictional boundaries. San Diego Bay is viewed as an ecosystem with all of its processes rather than a collection of individual species or sites or projects.

### **Southern California Bight Regional Monitoring Program**

The Southern California Bight Regional Monitoring Program is a multidisciplinary effort coordinated by the Southern California Coastal Water Research Project (SCCWRP) to provide an integrated approach to the ongoing environmental monitoring and evaluation of the region's coastal waters, sediments and associated biota. The first regional survey was conducted in 1994 and involved 12 agencies that cooperatively sampled 261 sites along the continental shelf between the US/Mexico border and Point Conception. During two subsequent surveys, the Southern California Bight 1998 and 2003 Regional Monitoring Projects (Bight '98 and Bight '03, respectively). This effort was greatly expanded with the addition of many new participants and the sampling of more habitats. Especially relevant to this report is that both Bight '98 and Bight '03 included habitats in San Diego Bay in their regional assessments. SCCWRP and the other participating southern California agencies intend to repeat these region wide efforts every five years with the next project scheduled for 2008 (Bight '08). Information provided by SCCWRP for Bight '98 and other projects was used to evaluate trends in water and sediment quality and potential benthic community (and, to a lesser extent, fish) impacts. The results from Bight '03 are not yet available.

### 3. Health of The Bay

The enabling legislation specified that the report contain “an evaluation of existing and historic data and trends in the overall health of San Diego Bay, including, but not limited to, trends in pollutant levels and trends in the numbers and diversity of species”. The intent of the legislation is to address certain deficiencies in our understanding of the condition of San Diego Bay thereby improving decision-making for protection, cleanup or improvement of the Bay.

This report does not attempt to define “health” based solely on numeric criteria, nor does it make a firm determination on whether or not the bay is considered “healthy” in its current state. Instead, the Committee looked at the condition of the Bay based upon both water and sediment quality issues, the size and diversity of fish populations, and abundance of wildlife species. The Committee reviewed information available from 1990 to the present.

#### 3.1. *Findings on Habitats, Species Abundance and Diversity*

##### 1. **Development has impacted habitat availability**

There has been a 70% loss of salt marsh, 84% loss of intertidal areas other than salt marsh, and a 42% loss of shallow subtidal zone habitats, when compared to historic habitat acreages over the past 100 years. Additionally, 74% of the shoreline is now armored with artificial hard structures, a type of substrate not native to the Bay and of limited value to native wildlife. More than 131 acres of the Bay’s surface waters are covered by structures such as docks, piers and wharves, excluding ships and boats. Upland transition areas needed by many species are now scarce and have been converted to industrial or urban uses.

##### 2. **Some species populations have declined because of impacts on habitat**

Habitat loss or degradation is one of the most direct and obvious impacts to San Diego Bay and the declining populations of some species are believed to be directly tied to these losses. These species include the federally listed endangered light-footed clapper rail and California least tern, and the threatened western snowy plover. However, for some species, the influences of pollution, changing food chains and other aspects of environmental structure may be greater than direct habitat modification.

##### 3. **Unvegetated shallow subtidal areas are essential for the California halibut, which is in decline**

Unvegetated shallow subtidal areas in the bay are essential as a nursery for the California halibut and are facing continuing habitat degradation threats. The lack of descriptive or quantitative information about the values of unvegetated shallow subtidal habitat has probably hindered its protection.

4. **Current Fisheries surveys are consistent with findings from the 1990s**  
A continuation of the 1994-1999, 5-year fish sampling study was repeated in April and July of 2005. During this sampling, 57 species of fish were collected with topsmelt being the most abundant species, comprising 30.4% of the catch, followed by deepbody anchovy (25.3%), then slough anchovy (20.5%), northern anchovy (5.7%), and shiner perch (4.8%). In terms of biomass or weight, round stingrays dominated the catch (37.7%) followed by the bat ray (12.5%), spotted sand bass (12.5%), deepbody anchovy (4.6%), and topsmelt (4.2%).
5. **Recent Management efforts appear to have benefited some bird populations**  
Through habitat and population protection measures, designation of reserves, water quality improvement, and intense management on the part of individual agencies, the California least tern and other birds that use San Diego Bay for nesting, appear to have increased their numbers and use of the bay over the last 40 years. As development continues within and around the bay, additional measures may be necessary to protect current levels of species diversity and abundance. While the list of both bird and fish species probably approximates that of the historic bay, the lower abundance of many species reflects the modern change in habitat conditions and use patterns.

### 3.2. ***Findings on Trends in Water and Sediment Quality***

1. **Data regarding water and sediment contamination levels appears to be mixed**  
For some contaminants, the overall levels of contamination within San Diego Bay appear to be lower today than they were during the previous decades in both water and sediment quality. This is demonstrated by the decreasing trends of some metals and polycyclic aromatic hydrocarbons (PAHs) in the open bay sediments and waters. Other data sets suggest that toxicity still exists in some areas in the Bay. It should be noted that the available data are for certain pollutants that constitute only a subset of all that may actually be present.
2. **Pollutant levels tend to be higher in areas of industrial uses and urban runoff**  
The shoreside areas adjacent to industrial facilities and areas that receive significant urban runoff, tend to be the most polluted regions of the bay. This is also evident based on the observation of lower species abundance and diversity of both benthic and fish communities, as well as by the noted presence of non-indigenous or invasive species within these areas.

3. **Physical water quality parameters are predictable**

Except for seasonal fluctuations, physical water quality parameters (salinity, dissolved oxygen, temperature, and pH) have not shown changes during historical monitoring. Higher temperatures and salinity levels were observed more frequently in the shallow waters of the south and south-central regions of the bay where less tidal exchange and dilution occurs and where a power plant uses large quantities of Bay water for cooling.

4. **Dissolved copper levels exceed chronic, and sometimes acute water quality criteria**

Dissolved copper concentrations in the water column are beyond chronic limits and sometimes acute limits, especially in the shoreside areas. Additionally, the shoreside areas in the north and north-central regions of the bay contain the highest concentrations. In general, the open bay area has lower copper concentrations overall.

## 4. Natural Resource Enhancement

San Diego Bay's core natural resource values are its warm, nutrient-rich, shallow waters, shelter from waves, and somewhat reduced number of marine predators. These factors combine to make the Bay especially valuable as a nursery for many marine species, a productive feeding and resting ground for migrating birds and fish, a safe haven for nesting sea birds, and a protected harbor for shipping, commerce, recreation and military activities. The surrounding shoreline habitat also provides nesting and resting opportunities for many bay and sea birds. Some of the Bay's estuary-like functions are those presently concentrated in the southern end, where warmer water provides opportunities for organisms indigenous to estuaries to thrive. Eelgrass beds support high levels of productivity while vegetated and unvegetated areas provide foraging opportunities for species that depend upon bottom-dwelling invertebrates for food. The intertidal shorelines provide prey for foraging shorebirds and, especially at high tide, juvenile and adult fishes. The harbor-like northern end of the Bay, which opens onto the ocean, provides shelter from waves and the depth necessary for commercial shipping, making it ideal for industry and military use.

The San Diego Bay Integrated Natural Resources Management Plan (INRMP) provides a bay-wide strategy for natural resources stewardship, which could lead to a more coherent and effective management strategy if well implemented. Currently, two out of 29 restoration or enhancement projects identified in the INRMP have been implemented. These include filling the Borrow Area, and the Navy's island off of the Naval Amphibious Base Coronado, Naval Base Coronado (NAB), both efforts toward the North Delta/NAB Shoreline Enhancement. Certain others are expected to be implemented eventually through normal regulatory channels and mitigation for construction projects. This list is not complete and many other projects are possible. The only reliable means for accomplishing needed restoration efforts is by compensatory mitigation to offset impacts from a development project. Without the compensatory support of development projects, about 20 of the projects that were identified are not likely to be implemented.

While the legislation directs the Committee to provide information on the habitat enhancement projects proposed in the INRMP, a thorough review of the projects identified several constraints limiting project implementation. These constraints are detailed below.

### 4.1. *Findings on Constraints to INRMP Implementation*

1. **Funding needs to be identified for natural resources enhancement projects**  
Although consensus was reached among the participants in the INRMP on the proper way to approach the protection of natural resources in the bay, the plan lacked an organizational "driver" for implementation that would attract, manage and allocate sufficient resources to implement it. As a result, very few of the more than 1,000 actions

identified in the INRMP have been implemented. Compliance with environmental laws, especially those regarding threatened or endangered species and clean water, focus on offsetting the effects of each individual project. The result is that natural resources are nominally maintained with only incidental isolated improvements in their status, and few instances of recovery of what has been lost in the past. While efforts to offset incremental losses of ongoing projects are important, significant resources are needed for restoring historic losses, for repairing system-level deficiencies in the bay, and for implementing restoration or enhancement opportunities.

2. **There are no mechanisms that exist for coordinating management efforts to address bay-wide ecosystem issues**

Currently, cross-jurisdictional efforts only address upstream issues such as urban runoff and watershed protection (through NPDES Permits and the Otay Watershed Management Plan). There is no formal mechanism by which Bay stakeholders can jointly address shared problems or work together to take an ecosystem approach for issues directly within the bay. As a result, current strategies do not effectively provide bay-wide natural resources protection/ enhancement. Since ecosystems are interconnected and exist at all scales, proper management for issues within San Diego Bay should include the ability to connect across jurisdictions.

3. **Projects that achieve multiple public objectives need to be promoted and funds sought**

Water quality improvement, cleanup of contaminated areas, and habitat protection issues are generally managed and accounted for separately, even when the approach to these objectives overlap. There are missed opportunities for getting the most out of available funding for the maximum ecological benefit to the Bay. There is a need to plan, promote, and implement projects that achieve multiple public objectives.

4. **A program should be designed to address exotic species introductions into the Bay**

Vessels arriving from foreign ports often bring with them species of marine life that have attached to the vessel hull. These "exotic" or "invasive" species can pose a threat to local indigenous marine life by competing for space or resources or by predation. There are exotic species in the Bay. Presently there is no efficient and effective program to avoid, detect, or respond to exotic species threats. The potential for the introduction of additional exotic species is real and the threat to the bay ecosystem so significant, especially in shallow or brackish habitats, that early detection is essential and would require resources and collaboration among jurisdictions and among technical specialties.

5. **Cumulative impacts from multiple, separate projects need to be fully understood and evaluated**

There is no mechanism to ensure that cumulative effects identified in environmental documents (CEQA) or in planning are avoided or minimized. This is especially true for projects that are small but repeated on a wide scale, such as construction, maintenance, and repairs of piers, wharves, and shoreline protection structures. Quantifying the effects of projects from a cumulative perspective is difficult to accomplish, because it requires quantification of the connections among species, food sources, foraging behaviors, and habitats, and between the proposed project and all past, present, and reasonably foreseeable future actions.

## 5. Stormwater Management

The implementing legislation directed the Committee to address issues associated with “stormwater treatment systems meeting toxicity standards.” These stormwater toxicity standards are included in a small number of National Pollutant Discharge Elimination System (NPDES) permits issued to businesses with discharges to San Diego Bay. These businesses/organizations include NASSCO, BAE Systems San Diego Ship Repair (Southwest Marine), Northrop Grumman Newport News (Continental Maritime), the commercial boatyards, and the U.S. Navy. Similar standards are not included in the San Diego County Municipal Stormwater permit, which is applicable to cities and commercial businesses, the Statewide General Industrial Stormwater permit which applies to a number of San Diego businesses, or in any other NPDES permit applied in San Diego County.

### 5.1. *Findings Relating to Stormwater Toxicity and NPDES Permit Toxicity Requirements*

- 1. Specified industrial stormwater permits include acute toxicity standards**  
The San Diego Regional Water Quality Control Board has included acute toxicity standards in the site-specific stormwater permits for the U.S. Navy and the three San Diego Shipyards - NASSCO, BAE Systems San Diego Ship Repair, and Continental Maritime, and the commercial boatyards.
- 2. To date, the impacted permittees have not identified a reliable, permanent means of complying with the toxicity provision of their permit**  
The U.S. Navy and shipyards have expended considerable efforts and funds to comply with the Regional Water Quality Control Board’s toxicity standards. These efforts include past and on-going evaluations of treatment technologies to reduce toxicity in stormwater discharges. There have been both successes and failures with meeting the toxicity standards during the evaluations. Further testing will be necessary to determine methods for consistently complying with the standards in ways which are both feasible and economically practical.
- 3. The current means of compliance may not be available in the future**  
At present, for most storm events all three shipyards capture and contain the industrial storm water runoff from their facility and divert it into the sanitary sewer system. It is uncertain how much longer the City of San Diego will authorize these discharges into their system.

## 6. Other Findings

During its work, the Committee identified several regulatory and/or data gaps, which restrict the ability to adequately, assess bay health. Generally speaking, most regulatory programs require such focused objectives that data from these programs are difficult to combine or compare to other data. Regulatory requirements for development projects also limit the ability to make decisions comprehensively for the overall improvement of the bay because they are specific to project mitigation and are focused on site-specific issues. Finally, most regulatory programs focus solely on water and/or sediment quality with little or no consideration given to habitat impacts. The following findings provide more detail on some of the limitations that impede progress on overall bay improvements and identify where additional efforts may be required to improve bay health and/or assessments of bay health.

### 6.1. *Regulatory Gaps*

1. **Regulatory efforts have been ineffective at protecting against the loss of intertidal habitat**

There appears to be a continued threat of gradual loss of intertidal habitat despite the existence of pertinent laws, regulations, and policies. Until the recent proposal for the creation of mudflat under the Navy's CVN II project, few resources have been committed to creating or restoring this habitat. The area of intertidal flats has been severely reduced from their historic levels in the Bay and elsewhere in southern California, mostly from impacts that pre-dated the Clean Water Act. As a result, many dependent shorebirds are declining along the Pacific Flyway.

2. **Regulatory guidance and protections are not in place to guide development in areas of sensitive habitat**

There is inadequate environmental guidance or consensus on the effect and appropriate design of development proposed in proximity to sensitive resource areas, particularly those areas that have been set aside for resource protection. Guidance is also lacking for how needed improvements, such as shoreline stabilization structures, could be appropriately designed and implemented in areas of sensitive habitat.

3. **Regulatory guidance is not in place for the restoration of sediment transport from rivers and streams**

There are few, if any, opportunities provided through regulatory initiatives to restore the natural sediment transport functions of rivers and their tributaries. As their inputs have been controlled by dams or diversion, organic matter and fresh water no longer have the same natural role in San Diego Bay.

4. **Consensus needs to be achieved, and cross-jurisdictional efforts taken, to restore severely depleted habitats**

Non-traditional measures will be required to enhance severely depleted habitats. Consensus is needed on priorities, as well as the flexibility to cross jurisdictional boundaries (both ownership and regulatory agency) in order to implement the beneficial use of dredge material and other habitat improvement projects. It is possible that in some cases, mitigation for a series of projects may be combined for the purpose of accomplishing a larger or more ecologically effective project, without fines or penalties.

5. **Sediment quality objectives need to be developed and adopted**

Sediment quality objectives are being developed by the State Water Resources Control Board for a limited set of pollutants and primarily for protection of bottom-dwelling biota. Objectives need to be developed for both the traditional and emerging pollutants and they should address potential for pollutant impacts on aquatic vegetation, fish, wildlife, and human health. Formal adoption of objectives may take years. Until then, resource managers should consider objectives developed using widely accepted and peer-reviewed risk assessment protocols. Until sediment quality objectives are formally adopted, decisions about resource management and restoration may be argued on a project-by-project basis.

6.2. ***Data Gaps***

1. **There are significant data gaps on the nature and extent of pollutants in the Bay**

Pollutant monitoring efforts have not evaluated sediments in shallow intertidal mudflats and salt marshes. In addition, little is known about concentrations of pollutants accumulated in tissues of food web organisms. Current knowledge on pollutants in the Bay is for substances that have been recognized as pollutants for decades (traditional pollutants). These are only some of the pollutants that may be present. San Diego Bay, like other bays in the country, is subject to inputs and accumulation of substances associated with new products, and other products that have not been the focus of attention until recently (emerging pollutants). Until filled, these data gaps constitute a source of uncertainty about habitat quality and the potential for successful implementation of restoration projects.

2. **Additional studies are needed to sufficiently characterize the health of San Diego Bay and direct management actions effectively**

Stakeholders are unable to accurately report on many matters that concern the public, such as bay health or Key Management Questions outlined in the INRMP, because of a lack of long-term, time series data specific to San Diego Bay or nearby harbors. Regularly occurring monitoring programs such as the Bight Study and newly formed

programs such as the Regional Harbor Monitoring Program (RHMP) will help assess water quality and sediment quality status and trends and the ability of these surface waters to support beneficial uses over the long term. Both of these programs will look at several key components within the bay (fish, invertebrates, toxicity, bioaccumulation, water and sediment quality) and continue refining long-term trend assessments. Site specific, or focused studies such as sediment and water characterization investigations, will continue to be conducted as needed throughout San Diego Bay. These may provide information needed 1) to determine if pollutants beyond those traditionally studied are present at levels of concern, 2) to assess potential for sediment-borne and water-borne pollutants to enter and accumulate in food web organisms, and 3) to determine if any pollutants (traditional or emergent) are present at levels of concern in sediments and biota from intertidal mudflats and salt marshes, and 4) develop a strategy for improving the safety of frequent consumers of Bay fish.

3. **There is a need to invest in understanding the link between native species abundance and diversity and indicators of water and sediment quality in San Diego Bay**

Most of the financial resources currently expended on monitoring are tied to compliance with specific water and sediment quality requirements. Resources are also needed to monitor the designated beneficial uses of water that are related to natural resources (fisheries; preservation of designated biological habitats; estuarine and wildlife habitats; rare and endangered species; migration of aquatic organisms; and shellfish harvesting). The development and application of conceptual models linking the relatively abundant water or sediment quality data sets to species abundance and diversity also are needed.

4. **The relationship between the Bays tides and currents and the natural resources needs to be better understood**

More information needs to be collected on the relationship between hydrodynamic processes and resident populations of fish, benthic communities, and wildlife in order to improve management of the Bay's ecosystem.

5. **Consensus needs to be reached among stakeholders on standards for collecting and analyzing data on the Bay**

The ability to use the best available science for planning is constrained by the lack of sufficient ease of collaborating on studies, and integrating scientific work conducted outside of agency venues. Ecosystem management, which is based on a scientific understanding of ecosystem composition, structure, function, and interlinking processes, requires more and better research and data collection, as well as better coordination and use of existing data and technologies. Standards should be established for the collection, taxonomy, distribution, exchange, update, and format of ecological, socioeconomic, cartographic, and managerial data.

**6. Bird survey protocols need to be developed**

With the exception of listed species monitoring, the Audubon Christmas counts and the San Diego Bird Atlas, there has been no consistency in conducting general bird surveys around the Bay. As such, trends in diversity and abundance of avian species are undocumented.

**6.3. *Additional Efforts Needed to Achieve a Healthy Bay***

**1. Watershed planning is essential for the protection of San Diego Bay**

Watershed planning for some of the watersheds and other programs implemented collectively by cities for managing stormwater runoff have met with some success, but there remains a need for full implementation of these plans and programs, and integration with San Diego Bay water quality priorities.

**2. Effort is needed to understand and quantify the connections between water and sediment quality and natural resources**

Identifying and quantifying connections between natural resources and indicators of water and sediment quality is essential to making meaningful decisions on bay improvements. The INRMP reflected a knowledge gap that extends far beyond San Diego Bay, and even the Southern California Bight, when it lacked a well-developed quantification of these connections. This results in an inability to achieve as much benefit as possible for natural resources from the compliance programs which regulate water and sediment quality through an integrated approach.

**3. Efforts to protect and enhance eelgrass habitat should be continued**

The Southern California Eelgrass Mitigation Policy and certain efforts at mitigation banking for eelgrass should continue to be strongly implemented. The rate of loss of shallow subtidal habitat has been abated by the vigilant implementation and enforcement of the Clean Water Act and Southern California Eelgrass Mitigation Policy.

**4. Endangered and threatened species would benefit from a coordinated, baywide approach**

Improving coordination on efforts to protect endangered species would enhance their recovery. While the populations of many of the federally listed threatened and endangered species appear to be stable, others, including the light-footed clapper rail and western snowy plover are in decline. The INRMP proposed management strategies for protecting and, where possible, enhancing conditions that support the Bay's listed species. Such strategies included enhanced protection of the local foraging population of the green sea turtle and a bay-wide approach to predator management to increase fledgling productivity and pair numbers of the California least tern and western snowy plover.

- 5. Additional research needs to be performed on a variety of Bay topics**
- Although thirteen research topic areas were proposed in the INRMP to support natural resource management decisions, there has been no organized effort to raise funds or to do this research, which is generally considered peripheral to the organizational missions of the primary Bay stakeholders. Also proposed, but not implemented, were a biennial report on status and trends, and a biennial workshop or conference, either on San Diego Bay alone or to be held jointly with neighboring bay and harbor programs.

## **7. Recommendations**

The San Diego Bay Advisory Committee for Ecological Assessment, by consensus, makes three recommendations to the Legislature.

### **1. Create A Partnership to Facilitate Cross-Jurisdictional Implementation**

The San Diego Bay stakeholders need to form cross-jurisdictional partnerships in order to address the findings of this report and provide the integrated stewardship necessary to improve wetlands, other aquatic habitats, and water quality. A San Diego Bay Ecosystem Restoration Partnership would foster the collaboration needed to achieve the goal of a healthy Bay, seek the needed resources, and execute the consensus-based strategy developed in the INRMP. Legislative support may be necessary to implement the necessary actions, including, but not limited to those identified in the INRMP.

### **2. Implement Habitat Enhancement Projects that are Key to Bay Health**

There are several habitat enhancement projects identified in the INRMP that would make a major contribution to bay health and accomplish many public objectives which cross-regulatory boundaries. These projects also encompass nearly all the problems of INRMP implementation, in that they involve multiple landowners, are too large for any one jurisdiction to take on, and involve habitats which are historically the most impacted and severely depleted in San Diego Bay. The initial task of the Partnership should be to identify the most beneficial projects and move toward their implementation.

### **3. Implement a Biological Indicator Development Program**

The region needs to develop and implement a Biological Indicator Development Program to better understand the link between native species abundance and diversity and indicators of water and sediment quality in San Diego Bay. Such a program would provide adaptive management cues and help disparate programs operating under different laws and regulations to function as a more cohesive bay-wide program. It would facilitate more effective communication with the public about bay status and trends. It would add resolution to how beneficial use criteria are applied locally as they pertain to natural resources, such as fishing; preservation of designated biological habitats; estuarine and wildlife habitats; rare and endangered species; migration of aquatic organisms; and shellfish harvesting. This program may consider the use of benthic community indicators and bioaccumulation data for tracking the ecological health of the Bay.

## **Appendix A**

## **Baywide (Regional) Studies**

### **Bay Protection and Toxic Cleanup Program (BPTCP)**

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