Final Evaluation Findings

Tijuana River National Estuarine Research Reserve

July 1999 through August 2005

Office of Ocean and Coastal Resource Management
National Ocean Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

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I. EXECUTIVE SUMMARY

The Coastal Zone Management Act (CZMA) of 1972, as amended, established the National Estuarine Research Reserve System. Sections 312 and 315 of the CZMA require NOAA's Office of Ocean and Coastal Resource Management (OCRM) to conduct periodic performance reviews or evaluations of federally-approved National Estuarine Research Reserves. The review described in this document examined the operations and management of the Tijuana River National Estuarine Research Reserve (TRNERR) during the period of July 1999 through August 2005. California State Parks (CSP) administers TRNERR.

This document describes the evaluation findings of the OCRM Director with respect to TRNERR during the review period. These evaluation findings include discussions of major accomplishments as well as recommendations for program improvement. The fundamental conclusion of this evaluation is that CSP is successfully implementing and enforcing the federally-approved TRNERR.

The evaluation team documented a number of TRNERR's accomplishments during the review period. The reserve hired a full complement of well-qualified, dedicated staff. TRNERR significantly upgraded its facilities and increased its visibility. The reserve has an active friends group. The Research and Monitoring Program made progress in the implementation of the System-wide Monitoring Program, enhanced its work through the application of geographic information system technology and is a clear leader in estuarine restoration. The Education and Outreach Program expanded its K-12 programming for students and professional development offerings for teachers. The Coastal Training Program fostered increased communication and understanding of key coastal issues among its target audiences and effectuated change in decision-makers' behavior. The Education and Outreach Program increased community outreach and re-established a strong Education Advisory Committee. The Stewardship Program participated in an innovative, large-scale project designed to control invasive plants. The Stewardship Program also implemented a predator control effort to ensure survival and to aid recovery of endangered species.

The evaluation team also identified areas where the reserve and its programs could be strengthened. OCRM's recommendations are in the forms of one Necessary Action and eight Program Suggestions. The Necessary Action requires TRNERR to finalize its revised management plan within one year of receipt of final evaluation findings. Program Suggestions are made in the areas of the Reserve Management Authority, facilities, visibility, Research Advisory Committee, Coastal Training Program, Volunteer Program and invasive species management.

II. PROGRAM REVIEW PROCEDURES

A. OVERVIEW

NOAA's Office of Ocean and Coastal Resource Management (OCRM) began its review of the Tijuana River National Estuarine Research Reserve (TRNERR) in June 2005. The §312 evaluation process involves four distinct components:

- An initial document review and identification of specific issues of particular concern;
- A site visit to California including interviews and a public meeting;
- Development of draft evaluation findings; and
- Preparation of final evaluation findings, partly based on comments from the state regarding the content and timetables of recommendations specified in the draft document.

The recommendations made by this evaluation appear in boxes and bold type and follow the findings section where facts relevant to the recommendation are discussed. The recommendations may be of two types:

> **Necessary Actions** address programmatic requirements of the Coastal Zone Management Act's (CZMA) implementing regulations and of the federally-approved TRNERR. Each Necessary Action must be implemented by the specified date.
>
> **Program Suggestions** describe actions that OCRM believes would improve the program, but they are not currently mandatory. If no dates are indicated, California State Parks (CSP) is expected to address the recommendations by the time of the next regularly-scheduled evaluation.

A complete summary of accomplishments and recommendations is outlined in Appendix A.

Failure to address Necessary Actions may result in a future finding of non-adherence and the invoking of interim sanctions, as specified in CZMA §312. Program Suggestions that are reiterated in consecutive evaluations to address continuing problems may be elevated to Necessary Actions. OCRM will consider the findings in this evaluation document when making future financial award decisions relative to TRNERR.

B. DOCUMENT REVIEW AND ISSUE DEVELOPMENT

The evaluation team reviewed a wide variety of documents prior to the site visit, including: (1) the 2000 TRNERR §312 evaluation findings; (2) the federally-approved Environmental Impact Statement and program documents; (3) financial assistance awards

and work products; (4) semi-annual performance reports; (5) official correspondence; and (6) relevant publications on natural resource management issues in southern California.

Based on this review and on discussions with OCRM, the evaluation team identified the following priority issues:

- TRNERR's major accomplishments during the review period;
- Status of TRNERR's general administration, including grants, financial management and staffing;
- Status and visibility of research, education and stewardship programs, including local and system-wide initiatives such as the System-wide Monitoring Program and the Coastal Training Program;
- Status of facilities development and operation;
- Status of the management plan revision;
- Status of TRNERR's coordination with other federal, state and local agencies;
- TRNERR's role with local communities and its integration with partners; and
- The manner in which TRNERR and CSP have addressed the recommendations contained in the evaluation findings released in 2000. TRNERR's assessment of how it has responded to each of the recommendations in the 2000 evaluation findings is located in Appendix B.

C. SITE VISIT TO TRNERR

Notification of the scheduled evaluation was sent to CSP, TRNERR, relevant federal regulatory and environmental agencies, members of California's congressional delegation and regional newspapers. In addition, a notice of OCRM's "intent to evaluate" was published in the Federal Register on July 15, 2005.

The site visit to California was conducted on September 12-16, 2005. Ms. Rosemarie McKeeby, Evaluation Team Leader, OCRM National Policy and Evaluation Division; Ms. Nina Garfield, TRNERR Specialist, OCRM Estuarine Reserves Division; and Mr. Michael Graybill, Reserve Manager, South Slough NERR (Oregon) composed the evaluation team.

During the site visit, the evaluation team interviewed TRNERR staff, senior CSP and other state officials, local officials, Mexican officials, federal agency representatives, state legislators, university professors, environmental educators, nongovernmental organization representatives and private citizens. Appendix C lists people and institutions contacted during this review.

As required by the CZMA, OCRM held an advertised public meeting on September 14, 2005, at 7:00 p.m., at the Community Room, 825 Imperial Beach Boulevard, Imperial Beach, California. The meeting gave members of the general public the opportunity to express their opinions about the overall operation and management of TRNERR. Appendix D lists individuals who registered at the meeting. OCRM's response to written comments submitted during this review is summarized in Appendix E.

The evaluation team gratefully acknowledges the critical support of TRNERR staff with the site visit planning and logistics.

III. RESERVE PROGRAM DESCRIPTION

Tijuana River National Estuarine Research Reserve (TRNERR) is located in San Diego County on the southern coast of California. The reserve encompasses approximately 2,500 acres of tidally-flushed wetlands, riparian and upland habitats in the southernmost estuary on the west coast. Like most wetlands remaining in southern California, TRNERR is adjacent to a large urban population. Portions of the reserve fall within the City of Imperial Beach and the City of San Diego. Tijuana, Mexico is located immediately south of TRNERR along the U.S.-Mexican border, and three-quarters of the reserve's watershed lies upstream in Mexico.

TRNERR is one of the few remaining examples of relatively undisturbed, tidally flushed coastal wetlands in southern California. The reserve's estuarine habitats include open-water channels, beaches, barrier dunes, mudflats and salt marshes. Uplands include sensitive coastal sage scrub, riparian habitats and agricultural lands. TRNERR is a saline marsh habitat for most of the year and supports eight threatened and endangered species, including the light-footed clapper rail, California least tern, least Bell's vireo, salt marsh bird's beak and cordgrass.

NOAA's Office of Ocean and Coastal Resource Management (OCRM) designated TRNERR in 1982. The reserve is a mosaic of federal, state, local and privately owned lands. For example, the Tijuana Slough National Wildlife Refuge and Border Field State Park are located within TRNERR's boundary. Thus, the reserve is a partnership among OCRM, the U.S. Fish and Wildlife Service (USFWS) and California State Parks (CSP), which is the administrative lead agency for TRNERR. As the reserve's lead state agency, CSP supplies matching funds for OCRM financial assistance awards, primarily by providing staffing for TRNERR. USFWS contributes significant federal resources, and the California Coastal Conservancy and the California Coastal Commission provide state resources. Local governments, including the County of San Diego, the City of San Diego and the City of Imperial Beach, each contribute to and coordinate policy with the reserve.

The Southwest Wetlands Interpretive Association (SWIA) serves as a cooperating association for the reserve. SWIA is a non-profit organization dedicated to the acquisition, preservation and restoration of wetlands. CSP and SWIA divide OCRM funds; SWIA supports TRNERR's Research Coordinator, restoration efforts and Coastal Training Program. SWIA's match is provided by the Southern California Wetlands Recovery Project.

The Reserve Management Authority (RMA) maintains responsibility for setting TRNERR management policies. Through voluntary participation in the RMA, member agencies consent to establish reserve policies, jointly promote reserve programs, and

cooperate to provide funding and staff to accomplish the missions of the reserve. The RMA meets quarterly to conduct reserve business and to obtain public input.[1]

[1] Additional discussion regarding the RMA, including a list of member organizations, is provided in Section IV-A-2.

IV. REVIEW FINDINGS, ACCOMPLISHMENTS AND RECOMMENDATIONS

A. OPERATIONS AND MANAGEMENT

1. Staff

Reserve staff are responsible for the Tijuana River National Estuarine Research Reserve's (TRNERR) on-site development, operations and management. During the review period, TRNERR made progress in staffing by filling all of its core positions and several ancillary positions with well-qualified individuals. Staff at the time of the site visit included the Reserve Manager, Research Coordinator, Geographic Information System (GIS) Specialist, two Research Associates, Education Coordinator, two Education Specialists, Coastal Training Program (CTP) Coordinator, CTP Assistant, Stewardship Coordinator, two Park Rangers, Maintenance Specialist and Administrative Assistant. TRNERR staff must be recognized for their perseverance, creativity and dedication to research and education. The staff's commitment to and enthusiasm for their work were evident throughout the site visit and were critical factors in the progress that the reserve made in program implementation during the review period.

Additionally, TRNERR staff coordinate well among reserve programs and with external partners. For example, as noted in Section III, the Tijuana Slough National Wildlife Refuge is located within TRNERR's boundary. During the review period, reserve and refuge staff worked closely together to ensure seamless operations and management. The strong collaboration between reserve and refuge staff is a fundamental component of both programs' success in a complex urban environment.

Accomplishment: TRNERR made progress in staffing by hiring a full complement of well-qualified, dedicated staff. Reserve staff have proven a critical resource in the progress that the reserve has made in program implementation. The strong collaboration between reserve and refuge staff is a fundamental component of both programs' success.

2. Reserve Management Authority

As noted in Section III, TRNERR's administrative framework includes a Reserve Management Authority (RMA). The RMA is composed of representatives from California State Parks (CSP), U.S. Fish and Wildlife Service (USFWS), California Coastal Commission, California Coastal Conservancy, City of Imperial Beach, City of San Diego, County of San Diego, Southwest Wetlands Interpretive Association (SWIA), U.S. Border Patrol, U.S. Navy, International Boundary and Water Commission, City of Tijuana and City of Tecate. The RMA's objectives include: (1) coordinating activities of the various constituent agencies; (2) providing policy guidance; (3) overseeing progress toward achieving National Estuarine Research Reserve System (NERRS) requirements

and reserve goals; and (4) providing a forum for discussing complex issues and addressing conflict.

Five standing subcommittees advise the RMA:

- Resource Protection, Management and Restoration Committee: biological and cultural resource management programs, law enforcement, habitat management, restoration and enhancement;
- Research and Monitoring Committee: research and scientific monitoring;
- Education and Interpretation Committee: environmental education and outreach activities;
- Public Access, Use and Involvement Committee: recreation programs, law enforcement, signage, publications and public affairs;
- Watershed Coordination Committee: cross-border programs with partners in Mexico and all binational issues affecting the reserve's resources and programs.

Subcommittees consist of reserve staff, interested community members and at least one RMA member, who serves as chair. Subcommittees are charged with considering issues referred by the RMA, developing options, proposing strategies, and making recommendations. One important function of the subcommittees is to involve the public directly in decision-making at TRNERR. The RMA also forms ad hoc subcommittees to address specific issues, such as trails and exhibits, that fall outside the purview of the five standing subcommittees.

The evaluation team met with the RMA and discussed its current relationship with the reserve. While the RMA's stated objectives are fairly comprehensive, the RMA has not focused equally on all of its objectives. At the time of the site visit, the RMA essentially served as a venue for agency reporting; quarterly meetings consisted largely of program updates from the reserve and refuge. TRNERR staff noted that RMA meetings, as structured, do not make the best use of members' time and talents. Rather, staff indicated a need to refocus the RMA on its stated objectives, particularly on providing a forum for discussing complex issues. The evaluation team agreed that shifting the emphasis of the RMA's quarterly meetings from agency reporting to problem solving around specific reserve issues would be a more productive use of members' time and would benefit TRNERR.

1. Program Suggestion: NOAA's Office of Ocean and Coastal Resource Management (OCRM) encourages TRNERR and the RMA to work together to refocus the RMA on its stated objectives, particularly on providing a forum for discussing complex issues. The reserve and the RMA should strongly consider shifting the emphasis of the RMA's quarterly meetings from agency reporting to problem solving around specific reserve issues.[2]

[2] Following the site visit, the reserve began to address this issue by focusing RMA meetings on particular action items rather than on agency updates.

3. Management Plan

NERRS regulations require each reserve to have an OCRM-approved management plan that must be updated every five years. A reserve's management plan has three primary functions: (1) to provide a framework for the direction and timing of the reserve's programs; (2) to allow the Reserve Manager to assess how successfully the reserve's goals have been met and to determine any necessary changes in direction; and (3) to guide programmatic evaluations of the reserve. The plan must describe the reserve's goals, objectives and management issues. It must also identify the reserve's intended strategies for research, education and interpretation, public access, construction, acquisition and resource preservation, restoration and manipulation. Additionally, the plan is required to describe staff roles in each of these areas.

At the time of the site visit, TRNERR was operating under a management plan that OCRM approved in 2000. TRNERR's revised management plan, reflecting the reserve's vision and strategy for 2006-2010 was due in July 2005. During the review period, TRNERR directed funds to this mandatory task and made considerable progress on a revised draft management plan. Following his arrival at the reserve, the new Reserve Manager opted to slow the revision process so that the new management plan could incorporate recommendations from the evaluation process. OCRM encourages TRNERR, as part of the management plan revision process, to evaluate existing Memoranda of Understanding with its partners and to update them as necessary.

> **2. Necessary Action: TRNERR must finalize its revised management plan within one year of receipt of final evaluation findings. The status of the management plan revision must be described in TRNERR's semi-annual performance reports.**

4. Facilities

During the review period, TRNERR continued to emphasize facility development and enhancement to address several critical needs. For example, reserve facilities were inadequate to support essential functions and anticipated increases in staffing and public use. Thus, improving accessibility to the reserve was an integral part of recent facilities design. Additional facilities needs included increasing office space at the Visitors' Center and expanding meeting space to accommodate large groups. During the review period, TRNERR significantly upgraded its facilities through several important projects, including: (1) Visitors' Center renovation; (2) laboratory addition; (3) amphitheater construction; and (4) Goat Canyon enhancement.

TRNERR renovated its Visitors' Center by remodeling the interior and adding a new gift shop. The reserve also improved access to the Visitors' Center's exhibits for people with disabilities. TRNERR used recycled or manufactured materials throughout the renovation. At the time of the evaluation site visit, the reserve had begun construction on a small building adjacent to the Visitors' Center that will house a new auditorium and supplemental office space.

A new addition to the reserve's garage accommodates a small research laboratory, three offices and a common work area. The laboratory is furnished with lab benches, cabinets, sinks, safety equipment, and tools for water quality testing, biological sampling, coliform testing and a variety of other research activities. Prior to the addition, many such activities were conducted offsite or in the education lab. The dedicated, on-site research lab facilitates more efficient and better-coordinated research.

TRNERR built a very attractive amphitheater overlooking the Tijuana River Estuary on a gentle slope next to the Visitors' Center. Reserve staff use the amphitheater for activities such as Junior Ranger programs, educational programs for school groups, interpretive presentations for the general public and special events. The amphitheater addressed the need for additional presentation space at the Visitors' Center and is an ideal setting in which to offer programs about the estuary.

Stormwater and sediment runoff has been a constant and serious problem in the south end of TRNERR. During rainy months of the year, runoff from Goat Canyon caused flooding and heavy sediment loading that compromised habitat value and rendered Monument Road impassable, thus prohibiting access to Border Field State Park. In order to address these issues, the reserve initiated the Goat Canyon Enhancement Project, which included construction of: (1) two sediment retention basins in a series within the upper floodplain of Goat Canyon; (2) a new asphalt overlay and newly elevated sections of Monument Road; (3) three on-site mitigation areas; (4) a new entrance kiosk; (5) a visual berm; and (6) a processing pad for reclaimed sediment. The Goat Canyon Project not only significantly improves access to Border Field State Park, but also provides enhancements that enable staff and visitors to benefit fully from a unique educational and interpretive site. OCRM commends TRNERR for the Goat Canyon Enhancement Project and encourages the reserve to consider next steps. For example, TRNERR should consider pursuing a permanent funding source for sediment management in the south end of the reserve.

> **Accomplishment: TRNERR significantly upgraded its facilities through several important projects, including: (1) Visitors' Center renovation; (2) laboratory addition; (3) amphitheater construction; and (4) Goat Canyon enhancement.**

During the process of improving its facilities, the reserve frequently requested extensions on its construction grants. Extensions on multiple grants led to TRNERR having several outstanding construction grants open at once. One reason for the extensions was a shift in management personnel both at the reserve and at the relevant CSP district office. For example, all major capital outlay projects must be approved by CSP headquarters in Sacramento. Any project that is not submitted for approval a year in advance cannot be carried out the following year, regardless of the funding source. Lack of awareness of this requirement resulted in a significant delay in the reserve's amphitheater construction. OCRM recognizes that some of the contributing factors to construction delays, such as inclement weather and breeding seasons for threatened and endangered birds, were out of TRNERR's control. However, OCRM strongly encourages the reserve to address those

issues within its control that hamper the timely completion of construction grant tasks as soon as possible.

While TRNERR's renovations and additions during the review period clearly alleviated some of the lack of space at the reserve, the new construction may not be enough to adequately address all current space requirements. The new laboratory is a definite asset to the Research and Monitoring Program, but it is quite small. As the reserve's Research and Monitoring Program continues to grow, a larger laboratory may be required. Additionally, as described in Section III, TRNERR is surrounded by a large urban population that presents a variety of unique enforcement challenges. For example, the reserve is in serious need of a secure: (1) storage area for maintenance supplies and equipment; and (2) plant propagation area. TRNERR might also benefit from an on-site residence for an enforcement officer.

3. Program Suggestion: OCRM recommends that all TRNERR staff participate in clearly defining current and future space requirements and how they might be met. In particular, the reserve should strongly consider: (1) expanding its laboratory; (2) adding a secure storage area; (3) adding a plant propagation area; and (4) improving site surveillance. During this exercise, staff should consider which, if any, space needs could be met offsite through partnerships.

5. Visibility

TRNERR increased its visibility during the review period. Key staff positions, facilities additions and enhancements, new research projects and education activities and innovative partnerships have all contributed to the reserve's improved visibility. For example, TRNERR has improved its ties with the City of Imperial Beach. The city now regards the reserve as a critical part of its ecotourism initiative and promotes the reserve on the city's website.

Another factor that will continue to raise the reserve's visibility into the foreseeable future is its recent designation as a "Wetland of International Importance" under the Ramsar Convention on Wetlands. The Convention encourages nations to promote wetlands conservation and to list wetlands of international importance as Ramsar sites. The Convention also provides wise-use guidelines, training opportunities and access to financial resources. TRNERR is now one of only 22 Ramsar sites in the United States. The designation encourages international research and conservation and will benefit the reserve's image as a place for ecotourism. The designation was the result of years of hard work by reserve staff and dedicated partners. OCRM congratulates TRNERR on achieving such a distinction.

OCRM also encourages TRNERR to continue raising its visibility throughout the San Diego region through signage, participation in public events and a variety of media. More than one million people live within a short drive of the Tijuana Estuary, but many of them are unfamiliar with the reserve. TRNERR's Education, Outreach and Coastal

Training Programs provide an excellent opportunity not only to increase public awareness of the Tijuana Estuary and its importance, but also to improve understanding of coastal issues in general and to promote the entire reserve system.

> **4. Program Suggestion: OCRM encourages TRNERR to continue raising its visibility throughout the San Diego region through signage, participation in public events and a variety of media.**

6. Friends Group

TRNERR is fortunate to have an active friends group. The "Friends of San Diego Refuges" initially began as an organization to support all the wildlife refuges in San Diego County. The group started to hold its meetings at TRNERR because of the reserve's facilities. Eventually, the reserve asked the Friends of San Diego Refuges to run its gift shop, "The Clapper Rail Nest," at the Visitors' Center. At the time of the evaluation site visit, the group estimated that approximately 85 percent of its activities were centered at TRNERR.

In addition to operating TRNERR's retail shop, the group has played a valuable role managing funds for reserve special events, such as Fiesta del Rio.[3] The Friends of San Diego Refuges regularly assists with habitat cleanup and restoration projects at the reserve. The group also has helped enhance TRNERR's visibility within the local community.

> **Accomplishment: The Friends of San Diego Refuges supported TRNERR by operating the reserve's retail shop, managing funds for special events, assisting with habitat cleanup and restoration projects and enhancing the reserve's visibility.**

The Friends of San Diego Refuges has a relatively small membership. Thus, the group's board members undertake a majority of the work associated with the group's efforts. During the evaluation site visit, board members noted that they would like to expand the group's membership. Such an expansion would allow the Friends of San Diego Refuges to distribute its current workload and potentially to engage in activities such as fundraising.

7. Partnerships and Program Coordination

TRNERR coordinates well among reserve programs and with external partners. The reserve's staff regularly collaborate with and assist one another. During the site visit, the evaluation team was pleased to see key linkages among the programs that are essential to the reserve's mission of maintaining a stable environment in which to conduct research and translate it to the public. TRNERR also cooperates with external partners such as USFWS, SWIA, California Coastal Conservancy, U.S. Border Patrol, academia and the

[3] A description of Fiesta del Rio is found in Section IV-C-3.

local community. For example, the reserve's Stewardship Program works with the U.S. Border Patrol to provide environmental awareness training for new agents. OCRM commends TRNERR for its coordination among its core programs and with many external partners and encourages it to continue such efforts.

> **Accomplishment: TRNERR regularly engages in many diverse partnerships. The reserve successfully coordinates with federal, state, local, academic and private agencies and organizations.**

During the evaluation site visit, reserve staff described some difficulty coordinating with the California Coastal Commission, a key partner, on several restoration projects. Although both TRNERR and the California Coastal Commission share the goal of protecting, enhancing and restoring wetlands, reserve staff cited restoration projects where certain Commission regulations detracted from the overall success of the project. Commission staff noted that the Commission must uphold and implement its regulations, regardless of whether the permit applicant is a retail outlet or TRNERR, which is entirely understandable. However, given that a wetlands restoration project employing proven methods and incorporating the best available science is inherently different from most construction projects, it is worth asking if there is some mechanism that would allow the Commission to implement its regulations while accommodating a project that will actually restore more wetlands as a result of the accommodation. During the site visit, the CSP Chief Deputy Director noted that the issue might need to come before the California Ocean Council for resolution. First, the reserve would need to develop a proposal to address the issue. Then, CSP could act as the proposal's proponent and bring it before the Council. OCRM appreciates CSP's offer of assistance and strongly recommends that TRNERR develop such a proposal. OCRM also recommends that TRNERR work closely with the other NERRs in California, key restoration partners such as SWIA and the California Coastal Conservancy, and CSP leadership to develop the proposal.

B. RESEARCH AND MONITORING PROGRAM

The Tijuana Estuary has been an important research site for more than 30 years, and investigations carried out at the reserve have significantly contributed to the protection and restoration of local wetlands. In fact, a national protocol on estuarine restoration[4] is based on studies conducted at TRNERR. In order to improve understanding of how estuaries function, reserve staff and partners carry out regular research and monitoring of vegetation, fish, marine invertebrates, birds and reptiles. Additionally, TRNERR's educational water quality monitoring laboratory uses volunteers to study bacterial contamination of estuarine waters. This is one example of the important linkages between the reserve's research and education programs.

The primary objective of the reserve's Research and Monitoring Program is to provide sound science for effective management of coastal resources, including wetland

[4] Developed by Dr. Joy Zedler.

restoration. For example, TRNERR has instituted an ambitious restoration program with the goal of recovering hundreds of acres of wetlands. Such research greatly assists related efforts to reclaim some of California's most threatened habitats.

TRNERR has a strong Research and Monitoring Program that made good progress since the last evaluation. The evaluation team was especially pleased that the reserve hired a well-qualified, full-time Research Coordinator during the review period. The Research and Monitoring Program's major initiatives and accomplishments are described below.

1. System-wide Monitoring Program

Participation in and contribution to system-wide efforts such as planning, development and implementation are important aspects of being part of the NERRS. National programs and initiatives are developed in collaboration with all reserves and OCRM. One example of a system-wide effort is the System-wide Monitoring Program (SWMP). The goal of SWMP is to identify and track short-term variability and long-term changes in estuarine water quality, habitat and land use in each reserve. The data gathered through SWMP provides information about how estuaries function and change over time, enabling scientists to predict how these systems will respond to anthropogenic changes.

SWMP provides critically needed, standardized information on national estuarine environmental trends while allowing the flexibility to assess coastal environmental management issues of regional or local concern. Designed to enhance the value and vision of the NERRS as a system of national reference sites, this program has three components and a phased approach to implementation. The three components are:

(1) Abiotic Variables: SWMP currently measures pH, conductivity, temperature, dissolved oxygen, turbidity, water level and atmospheric conditions. In addition, the program collects monthly nutrient and chlorophyll samples and monthly diel samples at one SWMP data logger station. Each reserve uses a set of automated instruments and weather stations to collect these data for submission to the Centralized Data Management Office (CDMO).

(2) Biotic Variables: As funds become available, the reserve system also will incorporate monitoring of organisms and habitats into SWMP. The first aspect likely to be incorporated will quantify vegetation (e.g., marsh vegetation, submerged aquatic vegetation) patterns and their changes over space and time. Other aspects that could be incorporated include monitoring infaunal benthic communities and plankton communities.

(3) Habitat Mapping and Change: This component of SWMP will be developed to identify changes in coastal ecological conditions with the goal of tracking and evaluating changes in coastal habitats and watershed land use. The main objective of this element will be to examine the links between watershed land use activities and coastal habitat quality.

TRNERR has four permanent sampling stations within the Tijuana Estuary. Data loggers are immersed in the water and continuously measure water depth, temperature, salinity, dissolved oxygen, turbidity and pH at 30-minute intervals. Staff retrieve and calibrate the units every two weeks at low tide. After all the data is downloaded, staff replace the data loggers. Prior to the addition of the small research laboratory at TRNERR, the reserve's SWMP data was processed and analyzed at San Diego State University's Pacific Estuarine Research Laboratory (PERL). The new lab allowed the Research and Monitoring Program to transfer data processing and analysis from PERL to TRNERR, a significant accomplishment.

Accomplishment: With the addition of the research laboratory, the Research and Monitoring Program transferred all SWMP data processing and analysis to the reserve.

A weather station next to the Visitors' Center compiles data on air temperature, relative humidity, barometric pressure, rainfall, and wind speed and direction at 15-minute intervals. These weather data are available in real time on the Internet[5] through a cooperative relationship with PERL. All water quality and weather data is submitted to the CDMO at Baruch Marine Laboratory in South Carolina for inclusion in the NERRS database. OCRM commends the Research and Monitoring Program for fulfilling its SWMP requirements by successfully implementing the program and submitting high quality data to the CDMO.

In addition to monitoring the water quality and weather parameters described above, TRNERR, through its partnership with PERL, has tracked vegetation, fish and invertebrate communities since 1986. The resultant long-term data set allows researchers to evaluate ecosystem responses to environmental changes, such as El Niño, and human modifications, such as reduction of freshwater inflows. PERL's current monitoring program includes quarterly sampling of fishes and invertebrates and annual sampling of vegetation:

- Fish: staff catch, identify, count and then release fish and mobile macroinvertebrates. The data allows researchers to determine fish and crab densities, population size and relative species composition.
- Invertebrates: staff separate invertebrates from core samples, identify them to the lowest taxonomic level possible, and enumerate them.
- Vegetation: staff measure several vegetation parameters and soil salinities at 12 monitoring stations located in low marsh, marsh plain and high marsh.

2. Graduate Research Fellows

The NERRS Graduate Research Fellows (GRF) Program supports management-related research projects that enhance scientific understanding of the reserve system, provide information needed by reserve managers and coastal decision-makers, and improve

[5] http://www.perl.sdsu.edu/TRNERR

public awareness and understanding of estuarine ecosystems and management issues. GRF funds are available on a competitive basis to students enrolled in a full-time masters or doctoral program at accredited colleges and universities in the United States. Fellowships may be funded for up to three years. Applicants must address one of the nationally significant research priorities established by the NERRS and conduct research in one or more reserves. Research priorities include:

(1) The effects of nonpoint source pollution on estuarine ecosystems, and the role of estuarine ecosystems in mitigating this pollution;
(2) Evaluative criteria and/or methods for estuarine ecosystem restoration;
(3) The importance of biodiversity and the effects of invasive species on estuarine ecosystems;
(4) Mechanisms for sustaining resources within estuarine ecosystems; and
(5) Socioeconomic research on estuarine ecosystems.

TRNERR supported six GRFs during the review period. Examples of GRF projects at the reserve include, "Effects of cadmium pollution on *Mus musculus* populations in an estuarine system using metallothionein as a biomarker," "Enhancing germination and establishment in salt marsh restoration," and "Role of abiotic factors in determining invasion success of Argentine ants, *Linepithema humile*." GRFs present their research at TRNERR's monthly Friday Speaker Series and at RMA meetings. OCRM commends the Research and Monitoring Program for hosting high-quality GRFs during the review period and encourages it to continue recruiting strong graduate researchers to the reserve.

3. Restoration

TRNERR is a clear leader in wetland restoration work. The Research and Monitoring Program initiated and facilitated several excellent restoration efforts during the review period. The Tijuana Estuary Tidal Restoration Program (TETRP), a multi-phased, 500-acre restoration program designed to restore tidal exchange and wetland habitats, is a major component of the wetlands recovery effort in southern California. It has been funded by many sources, including the California Coastal Conservancy, USFWS, U.S. Environmental Protection Agency, and Southern California Wetlands Recovery Project. TETRP planning and implementation has been accomplished through a cooperative partnership among TRNERR, SWIA and the California Coastal Conservancy.

Adopted in 1992, Phase I of TETRP outlined a conceptual program for restoring approximately 500 acres of degraded wetlands in the south arm of the estuary. Construction of the Model Marsh was the first step in implementing the program. The Model Marsh was constructed in an area of former salt marsh that was filled through a series of natural and anthropogenic events. The project required the excavation of approximately 100,000 cubic yards of soil to create a marsh plain with a network of tidal channels. While the marsh plain surface is relatively flat, staff constructed it with the goal of creating three habitat types: (1) the area lowest in elevation located near the main intertidal channel was designed to function as a mudflat; (2) a middle-elevation band of marsh plain was planted with Pacific cordgrass to encourage development of the

preferred breeding habitat of the endangered light-footed clapper rail; and (3) the highest marsh plain elevations were left unplanted to promote salt marsh through natural recruitment. A primary research focus of this project is to test the role of tidal creeks in the development of wetland habitats.

Soil from the Model Marsh excavation was hauled a short distance to an inland stockpile site located in Goat Canyon, adjacent to an abandoned gravel quarry. In 2000, the quarry slopes were reconstructed, stabilized and planted with maritime succulent scrub, a coastal habitat found in only a few areas of San Diego County. Steep slopes were reinforced with geotextile and jute netting. Seeds were collected from target plant species in the immediate project vicinity and were broadcast over the reconstructed slopes prior to the onset of winter rains. An irrigation system was installed in 2001 to assist in the establishment and persistence of seeds that germinated during the winter. A monitoring and maintenance program was developed to ensure that the reconstructed slopes remained stable and that the habitat continued to thrive.

TETRP Phase I was based on the best available information at the time. However, changes in hydrology, biology and land use in the southern arm of the Tijuana Estuary and Mexico since 1992 warranted a substantial re-evaluation of the original plan. The reassessment, called TETRP Phase II, began in 2002. The project scope included investigation of a program that unifies marsh restoration with hydrology and beach nourishment, a principal goal of TETRP due to the progressive erosion of barrier dunes protecting the estuary. Resolving sediment disposal and beach nourishment issues through an integrated approach is critical for the success of TETRP Phase II.

Accomplishment: The Research and Monitoring Program is a clear leader in estuarine restoration. The program initiated and facilitated several ambitious restoration projects during the review period.

4. Geographic Information System

During the review period, TRNERR hired a full-time GIS Specialist who proactively works with the reserve's programs on a variety of innovative efforts. The reserve's GIS capability provides tools for managing geographical data and affords an opportunity for cooperative projects in resource management, planning, restoration and education. For example, TRNERR's GIS Program has established close working relationships with Mexican partners such as Colegio de la Frontera Norte and the City of Tijuana's Planning Department.

The application of GIS at the reserve has greatly enhanced the precision and usefulness of data produced for ongoing projects. For example, GIS was a critical component of planning for the Goat Canyon Enhancement Project, particularly regarding the endangered least Bell's vireo. Staff also use GIS to monitor the spread of invasive plants from year to year. The reserve is conducting research on advancing the application of remote sensing to identify specific invasive species. Using GIS, TRNERR also piloted a new habitat classification scheme. Researchers from San Diego State University used the

reserve's GIS database to delineate sub-watersheds and to characterize associated land use in drainage basins throughout the watershed. They also connected the data with water quality field sampling to highlight causal relationships and predictor variables for water quality.

Accomplishment: TRNERR hired a full-time GIS Specialist who proactively works with the reserve's programs on a variety of innovative efforts. The application of GIS at the reserve has enhanced the precision and usefulness of data produced for ongoing projects.

5. Research Advisory Committee

Almost every reserve in the NERRS has a research advisory committee (RAC) to help guide its Research and Monitoring Program. A RAC is usually composed of local researchers who bring relevant and interesting research to the reserve. One of a RAC's key functions is to collaborate on the development of the reserve's research and monitoring priorities. Additionally, a RAC can: (1) increase the reserve's visibility; (2) attract strong student researchers to the reserve; and (3) improve the institutionalization of the reserve's Research and Monitoring Program.

As noted in Section IV-A-2, TRNERR's RMA has several standing subcommittees, one of which is the Research and Monitoring Subcommittee. However, the evaluation team learned that the Research and Monitoring Subcommittee had not been active for some time, essentially leaving the Research and Monitoring Program without a functioning RAC. Given that TRNERR currently has a full-time Research Coordinator and is undergoing a revision of its management plan, it is timely for the Research and Monitoring Program to reactivate and revitalize its RAC. A well-qualified RAC could provide the following services to the Research and Monitoring Program:

- Reviewing and commenting on priorities for research and monitoring projects;
- Reviewing and commenting on research proposals and reports;
- Assisting with development of standard requirements for proposals, protocols and findings;
- Offering advice on local issues affecting the Tijuana River Estuary;
- Enhancing public awareness and visibility of TRNERR's Research and Monitoring Program; and
- Offering advice on opportunities for developing cooperative research and monitoring agreements.

5. Program Suggestion: OCRM strongly encourages the Research and Monitoring Program to reactivate and revitalize its RAC as soon as practicable.

C. EDUCATION AND OUTREACH PROGRAM

Education and outreach are integral components of resource protection and ecosystem management at TRNERR. Education and outreach are powerful tools because, in

actuality, managers do not manage resources, they manage the people who use the resources. In recognition of this significant human component of resource management, TRNERR's Education and Outreach Program strives to go beyond simply providing information to resource users, as information alone does not protect the resource. In order to effect lasting change on users' behavior, the program works to foster a sense of responsibility in target audiences. Because long-term protection of the reserve requires wise planning throughout the watershed, the Education and Outreach Program works with audiences on both sides of the international border.

TRNERR has an excellent Education and Outreach Program that made strong progress since the last evaluation. The program: (1) expanded high school science programs that link to the Research and Monitoring Program; (2) developed programs for middle school students; (3) planned and implemented a long-term education program for coastal decision-makers; and (4) integrated existing educational programs with watershed coordination. The Education and Outreach Program also increased its personnel by hiring two well-qualified, full-time staff, an Education Coordinator and a CTP Coordinator. The Education and Outreach Program's major initiatives and accomplishments are described below.

1. K-12 Education and Professional Teacher Development

One of the goals of TRNERR's Education and Outreach Program is to use the environment to engage students through "real world" learning experiences and to provide quality environmental education while focusing on estuarine habitat. TRNERR offers free visits to elementary, middle and high school students as well as to youth organizations like ecology clubs and service groups. All school visits to the reserve are theme-based and meet California state education standards. Marsh Awareness with Resources for Slough Habitats (MARSH) is targeted at elementary school students and was developed to introduce students to basic wetland and upland ecology and cultural history. MARSH has both classroom and field components that vary relative to the age of the students. In the field, students use hand lenses and binoculars to observe and record upland plants and shorebirds. Inside, students watch a video, play a game about animal adaptations, and explore the reserve's interactive exhibits. All teachers who participate in this program attend a two-hour orientation and are provided with optional classroom activities as well as required materials for the field trip.

Tijuana Estuary Explorers is another offering for elementary school students with both classroom and field components. The program incorporates reading, writing and science into four comprehensive activities about the Tijuana Estuary and its watershed. Using a personalized field journal, students read the field notes written by two characters, Pablo and Silvia Hernandez, as they explore the estuary. Along with the field notes, students find pages to start their own journal using a variety of questions and activities that are also provided. At the end of the field trip, teachers and students receive "Take Action" magnets and worksheets to help them protect wetlands. All teachers who participate in this program attend a four-hour training session that guides them through the classroom and field sections of the Tijuana Estuary Explorers.

TRNERR participates in the Junior Rangers Program, which is offered to children ages 7-12 at state parks throughout California. The program takes place once a week for an hour after school and is designed to help students discover the rich natural and cultural heritage found in state parks. At TRNERR, the Junior Ranger Program presents different topics, such as estuarine ecology, natural and cultural history, plants and wildlife, at each session. Awards such as pins, certificates and patches are given to participants as they advance through the program.

The Education and Outreach Program, its Education Advisory Committee, the Friends of San Diego Refuges, the National Park Service, CSP and Mar Vista High School worked together to develop the Tijuana Estuary High School Teachers' Guide. The guide is an inter-disciplinary high school curriculum designed to educate students about the Tijuana River Estuary's valuable natural and cultural resources. The curriculum aligns with California State Content Standards and is the only field-based estuarine science high school program in San Diego County. The guide's target audience includes biology, ecology, marine science, English and art students and teachers in San Diego County, especially South Bay.

Accomplishment: The Education and Outreach Program expanded its K-12 programming for students and professional development offerings for teachers. In particular, the Education and Outreach Program collaborated with its partners to develop the Tijuana Estuary High School Teachers' Guide, an innovative curriculum that is the only field-based estuarine science high school program in San Diego County.

2. Coastal Training Program

An important aspect of a reserve's Education and Outreach Program is CTP. The program is designed to: (1) inform coastal decision-making; (2) improve coastal stewardship at local and regional levels by increasing the application of science-based knowledge and skills by coastal decision-makers; and (3) increase dialogue and collaboration among coastal decision-makers. Planning for the program includes establishing a training advisory committee, conducting a market survey of training providers and an audience needs assessment, developing a program strategy that outlines priority coastal issues to be addressed during the next three to five years, prioritizing target audiences, and creating a marketing plan.

During the review period, TRNERR hired its first CTP Coordinator. Working with a diversity of partners in the U.S. and Mexico, staff conducted the initial CTP planning phases and began implementation of the program. Informational program offerings include consultations, seminars, watershed tours, hands-on skills training, participatory workshops, lectures, and technology demonstrations. In addition to fostering increased communication and understanding, TRNERR's CTP strives to effect tangible, "on the ground" change. Since its inception, the program has played a key role in facilitating interactions between U.S. and Mexican decision-makers on issues of importance to the

reserve's conservation and research missions. For example, CTP invited representatives from Tijuana's Municipal Planning Institute to present a project they had designed for the Alamar River to an audience of planners in southern California. Following the presentation, the audience provided their thoughts about and suggestions for the project. Subsequently, the Mexican planners significantly changed the project from its original concrete channel design. CTP then held a formal training workshop for Tijuana's municipal planners about pervious surfaces and alternatives to concrete channels. As a result, the Mayor announced that concrete channels will no longer be funded in Tijuana. Additional examples of CTP projects are described below.

Los Laureles Canyon Erosion and Sedimentation Control Project
Located along the border in Tijuana, Mexico, Los Laureles Canyon is home to a squatter community of nearly 40,000 that lacks even basic infrastructure. The canyon's steep and poorly-developed hillsides have resulted in unstable soils and flooding that: (1) destroys the community; (2) creates severe sedimentation and pollution problems downstream at TRNERR; and (3) adversely affects the surrounding coastline. To address this problem, CTP worked with the Municipal Planning Agency of Tijuana, the California Coastal Conservancy, International Community Foundation and others to implement community-based slope stabilization and erosion control.

Through several innovative pilot efforts, the project promotes a sustainable approach to erosion and sedimentation control that offers not only environmental but also economic and social benefits to the community. In one pilot project, community trainers taught local residents about erosion, trash management, and public health and safety. Simultaneously, the partners involved local residents in a reforestation project on the slopes behind their homes. The project incorporated low-tech and low-cost irrigation methods, and a local land use consulting company with a native plant nursery donated the plants. Other pilot efforts focused on improving awareness of the relationship between public health and the environment, establishing a recycling transfer station and composting. The Mayor of Tijuana committed $50,000 for the pilot projects, and the city donated land for a small community center, model home, plant nursery, composting and recycling station, and a site for producing pervious pavers.

Matadero Canyon Binational Conservation Easement
Matadero Canyon is located in Mexico immediately adjacent to TRNERR. The Matadero Canyon binational conservation easement is a proposal to create a physical extension of the reserve on the Mexican side of the border. The City of Tijuana has very few parks, and the Matadero Canyon Park will promote low-impact recreation and outdoor education. It will also serve as a centerpiece for future cross-border cooperative projects related to resource conservation, education and restoration.

A unique characteristic of the Matadero Canyon Project is that the Mexican government agreed to place the park's administration in the hands of a newly-formed Mexican nongovernmental organization (NGO) called Alianza Ambiental Fronteriza. CTP directly assisted with the creation of Alianza Ambiental Fronteriza, including

development of the NGO's scope of work. Reserve staff work directly through the City of Tijuana on this project.

Los Sauces Canyon Restoration Project
The goal of the Los Sauces Canyon Restoration Project is to create a new "sister" park in Mexico to complement Border Field State Park at TRNERR. While most projects in Mexico involving new park lands are initiated and implemented by the federal and state governments, the Los Sauces Canyon Park Project is taking a different approach and working directly through the municipal authorities in Tijuana. The City of Tijuana, representatives of Playas de Tijuana, and TRNERR are collaborating to ensure that locally-determined goals for the canyon are attained.

Accomplishment: TRNERR hired its first CTP Coordinator, conducted the initial CTP planning phases and began implementation of the program. CTP fostered increased communication and understanding of key coastal issues among its target audiences. The program also effectuated change in decision-makers' behavior through a variety of workshops and innovative projects that comprehensively address the environmental, social and economic causes of coastal resource degradation.

Much of the program's initial focus on Mexico was a result of two primary factors: (1) the severity of the environmental degradation in communities such as those in Los Laureles Canyon and the resulting sedimentation affecting TRNERR; and (2) the window of opportunity presented by the Mayor of Tijuana's willingness to work with the reserve to address environmental issues. OCRM understands this reasoning and is very impressed with CTP's innovative work during the review period. However, it is clear that TRNERR's program has evolved beyond the scope of the typical CTP. In addition to conducting coastal decision-maker workshops, TRNERR's CTP Coordinator and CTP Assistant are extensively involved in actively promoting improved land-use practices throughout the watershed, particularly in Mexico. Such work is extremely important, relevant and appropriate for TRNERR; however, the CTP Coordinator and CTP Assistant are essentially staffing a watershed management program in addition to their CTP duties.

6. Program Suggestion: TRNERR should establish a distinct Watershed Coordinator position with responsibility for the reserve's watershed management and land-use programs. The CTP Coordinator position should focus on providing current scientific information and skill-building opportunities to coastal decision-makers.

During the site visit, the evaluation team noted several opportunities where CTP should collaborate with the Research and Monitoring Program on projects in the northern portion of the watershed within the United States. For example, permit conditions for a TRNERR wetland mitigation project in the San Diego area required certain planting techniques that research at the reserve's model marsh had shown to be unnecessary and potentially detrimental. The direct transfer of research results to local decision-makers should help to address such issues in the future. Additionally, CTP should consider

refocusing some of its efforts on issues associated with Tijuana River flooding. The program might also consider re-establishing its outreach tours to northern estuaries in San Diego County as well as to the estuaries near Ensenada and San Quintin.

7. Program Suggestion: The Education and Outreach Program should engage its partners in an examination of the role of CTP north of the U.S.-Mexico border. Such an examination should consider: (1) the goals of a CTP northern component; (2) potential projects where CTP could add value; (3) the relationship of a CTP northern component to projects currently underway in Mexico; and (4) the feasibility of a CTP that addresses issues in both the United States and Mexico.

3. Community Outreach

Community outreach is an important aspect of TRNERR's programming. During the review period, the Education and Outreach Program increased community outreach through its programs described above and through participation in public events. Examples include:

- Earth Day: The reserve welcomed volunteers to celebrate Earth Day by working on projects such as removing non-native vegetation and planting native plants or maintaining and improving an existing area at the reserve.

- International Migratory Bird Day: TRNERR invited the public to acknowledge the journeys of migratory birds during the international festival. Attractions included bird call experts, "Raptor Ambassadors," crafts, a bird walk, and a showing of "Winged Migration."

- International Coastal Cleanup Day: The International Coastal Cleanup is the largest beach and waterway cleanup program in the world. Volunteers clear tons of trash from coastlines, rivers and lakes each year. In 2005, TRNERR sponsored the Border Field State Park site for the cleanup.

- Fiesta del Rio: During the review period, TRNERR began organizing and hosting this annual event that honors the Tijuana River Estuary and its cultures. Promoted as a celebration "where nature and nations meet," Fiesta del Rio encourages participants to rediscover their Californio or Californian pride as they experience the stories, music, dance and drama of the peoples of the Tijuana River Estuary.

Accomplishment: The Education and Outreach Program increased community outreach through participation in a variety of public events. In particular, the program put forth an outstanding effort to develop and host "Fiesta del Rio," a unique, engaging and highly-educational community celebration.

4. Volunteer Program

Volunteers can be a great asset to a reserve, providing critical support for operations and programming. Among other tasks, volunteers can assist permanent staff with: (1) operating the Visitors' Center, (2) performing administrative tasks, (3) assisting with facility maintenance and public access improvement projects, (4) assisting with research and monitoring projects, (5) providing staff support for programming, workshops and special projects, and (6) serving as Advisory Council members. Additionally, as a strong link to the local community, volunteers also can provide invaluable outreach for a reserve. NERRs with formal volunteer programs often require volunteers to read a volunteer handbook and to attend orientation meetings and special training sessions throughout the year.

TRNERR staff estimated that there are approximately 15 to 50 active reserve volunteers at any given time. However, the reserve lacks a formal Volunteer Program that actively recruits, trains and schedules volunteers. Over time, TRNERR has prepared many of the materials associated with a formal Volunteer Program, such as a volunteer handbook, but the reserve has no Volunteer Coordinator. As a result, each of the programs works with individual volunteers largely on an ad hoc basis, resulting in an unsystematic and fragmented Volunteer Program.

At least two previous evaluations of TRNERR have recommended that the reserve hire a Volunteer Coordinator to manage all the elements of an operational Volunteer Program. It appears that funding has been the chief impediment to adding such a position to the reserve. OCRM understands the difficult financial situation currently facing the California state government. However, OCRM continues to urge that the reserve address its lack of a formal Volunteer Program. A formal program would be a significant asset to reserve operations and programming. As the reserve has been receiving increased requests for time from potential volunteers and is in the process of revising its management plan, it is currently an opportune time to formalize TRNERR's Volunteer Program.

> **8. Program Suggestion: OCRM strongly encourages TRNERR to add a Volunteer Coordinator position to its staff and to formalize its Volunteer Program. The reserve should collaborate with USFWS to explore a jointly-funded position that would benefit both the reserve and the refuge. If such an arrangement is impossible, OCRM urges TRNERR to work with its partners to explore other options.**

5. Education Advisory Committee

Nearly every reserve in the NERRS has an education advisory committee (EAC) to help guide its Education and Outreach Program. A reserve's EAC, like its RAC, is a critical resource for its programming. Composed of local educators, an EAC provides a variety of services to a reserve:

- Offering advice on opportunities for developing partnerships and cooperative agreements for education and training programs;
- Reviewing and commenting on priorities for education and interpretive activities;
- Reviewing and commenting on proposals for curriculum development, videos, and other media materials about the reserve;
- Offering advice on the design of exhibits and interpretive facilities;
- Providing assistance in planning and implementation of seminars and outreach activities; and
- Promoting interagency and inter-organization communication and information exchange between the reserve and other groups.

During the previous review period, TRNERR's EAC became inactive. In 2003, TRNERR hired a new, full-time Education Coordinator who re-established the reserve's EAC soon thereafter. In general, the EAC meets quarterly. It is composed of representatives from: (1) the Friends of San Diego Wildlife Refuges, (2) an elementary school in the South Bay District, (3) the Poseidon Academy at Mar Vista High School, (4) USFWS Refuges Education and Information Specialists, and (5) the County of San Diego Clean Water Program. At the time of the site visit, the Education and Outreach Program was considering adding several individuals from local NGOs to the Committee.

During the site visit, the evaluation team met with the EAC and was very impressed with the members' qualifications, dedication and enthusiasm. The Committee helps the reserve serve as a resource for environmental education throughout the watershed. The EAC also supports the education and outreach goals of the region-wide Multiple Species Conservation Program. Additionally, the EAC coordinates TRNERR's education programs with those of San Diego's South Bay in order to more efficiently deliver field experiences to the greatest number of students.

Accomplishment: The Education and Outreach Program re-established a strong Education Advisory Committee composed of well-qualified, dedicated individuals.

D. STEWARDSHIP PROGRAM

During the last several years, NERRS has focused on developing a stewardship component to complement its existing research and education programs. The mission of TRNERR's Stewardship Program is to protect the reserve's ecosystems and to maintain the integrity of those ecosystems through informed action. The program addresses past, present and future conditions that have affected or may affect the integrity of the reserve's estuarine ecosystem. The Stewardship Program has four primary goals:

- Preserve, restore, enhance and protect all habitats to maintain biodiversity, maintain important migratory bird resources, and aid in the recovery of threatened and endangered species;
- Respond to identified problems by establishing cooperative and integrated approaches;

- Monitor and assess land use activities within the watershed and attempt to influence practices to promote the health of the reserve; and
- Complete acquisition of all land parcels within the reserve's boundary.

1. Invasive Species Management

Invasive species management is one of the most serious challenges facing TRNERR's Stewardship Program. Invasive species represent an acute threat to ecosystem integrity, and both the rate and impacts of invasions have increased over time. As highly variable systems subject to a variety of disturbances, estuaries are especially vulnerable to invasion. Furthermore, because estuaries exist at the interface of the marine, terrestrial and freshwater environments, they are subject to invasions from each of these habitat types.

The giant reed, salt cedar and castor bean are the three predominant invasive species at TRNERR. The abundance of these species is altering the estuary's ecosystem. In response, the Stewardship Program participates in the Invasive Plant Control Program, a large-scale project designed to control these three species in the Tijuana River Valley. Initial stages of the project include determining the extent of the plants' invasion in the valley and identifying demonstration sites for assessing the best methods of invader control. The results of these efforts, coupled with other available information, will be applied to invasive species management efforts throughout the Tijuana River Valley. The Stewardship Program anticipates that these efforts will help facilitate the recovery of the ecosystem's native species.

> **Accomplishment: The Stewardship Program participated in an innovative, large-scale project designed to control giant reed, salt cedar and castor bean invasions in the Tijuana River Valley.**

At the time of the evaluation site visit, the Stewardship Program was collaborating with the Research and Monitoring Program and SWIA to develop a comprehensive invasive species management plan. The plan will encompass both terrestrial and aquatic ecosystems. It will also provide a valuable framework for understanding and managing invasions at the reserve. The plan could serve as a model for other estuaries. OCRM strongly supports the reserve's efforts to develop a comprehensive invasive species management plan.

OCRM also recommends that the Stewardship Program consider methods of further improving early detection and removal of invasive species at the reserve. For example, CSP currently oversees an inspection protocol that helps detect new invasive species. Monitoring is critically important, particularly given recent invasions of *Caulerpa taxifolia*, dubbed the "killer algae," in nearby estuaries. TRNERR's Stewardship Coordinator conducts inspections and coordinates invasive species removal. However, additional resources, such as funding for comprehensive monitoring and an exotics removal and restoration laborer, would significantly improve the reserve's ability to detect and address invasives species before they become well-established.

9. Program Suggestion: OCRM encourages the Stewardship Program, in conjunction with its contributions to the invasive species management plan, to consider methods of further improving early detection and removal of invasive species at the reserve.

2. Predator Control

The Stewardship Program employs active management to aid recovery of the light-footed clapper rail, California least tern, western snowy plover and least Bell's vireo. Research and monitoring data indicate that once habitat concerns are addressed, predation is the greatest threat to survival and recovery of these endangered birds. While a variety of animals pose a threat to endangered birds at the reserve, the most prevalent predators are feral and stray dogs and cats. In response, the Stewardship Program conducts live-trapping of feral and stray dogs and cats throughout the year. All captured domestic dogs and cats are taken to a veterinary care facility or an approved animal shelter operated by a cooperating local unit of government or the Humane Society.

Predator control includes a pre-season survey, appropriate control during the nesting season and post season follow-up. It involves extensive interagency coordination and is a cornerstone of endangered species protection and recovery efforts at the reserve. However, the reserve's predator management approach, while essential for the survival of several endangered species, is potentially controversial. Recognizing this potential, the Stewardship Program has undertaken a public awareness campaign. Prior to nesting season, staff meet with local residents and inform them of the threat that dogs and cats pose to the endangered birds and of the need to control predators at the reserve. This approach has been very successful. Not only has the Stewardship Program's outreach lessened the controversy of the predator control measures, it has also reduced the number of local pets straying onto the reserve.

Accomplishment: The Stewardship Program implemented a predator control effort to aid recovery of the light-footed clapper rail, California least tern, western snowy plover and least Bell's vireo. A public outreach campaign is a key element of the program's success.

V. CONCLUSION

For reasons stated herein, I find that California is adhering to the programmatic requirements of the National Estuarine Research Reserve System in the operation of the federally-approved Tijuana River National Estuarine Research Reserve.

The reserve has made notable progress in the following areas: staff, facilities, visibility, friends group, System-wide Monitoring Program, restoration, geographic information system, K-12 education and professional teacher development, Coastal Training Program, community outreach, Education Advisory Committee, invasive species management and predator control.

These evaluation findings contain nine recommendations. These recommendations are in the form of one Necessary Action and eight Program Suggestions. The state must address the Necessary Action by the date indicated. The Program Suggestions should be addressed before the next regularly-scheduled program evaluation, but they are not mandatory at this time. Program Suggestions that must be repeated in subsequent evaluations may be elevated to Necessary Actions. Summary tables of program accomplishments and recommendations are provided in Appendix A.

This is a programmatic evaluation of the Tijuana River National Estuarine Research Reserve that may have implications regarding the state's financial assistance awards. However, it does not make any judgment about or replace any financial audits.

/S/ David M. Kennedy
David M. Kennedy
Director, Office of Ocean and
Coastal Resource Management

August 30, 2006
Date

VI. APPENDICES

Appendix A. Summary of Accomplishments and Recommendations

The evaluation team documented a number of TRNERR's accomplishments during the review period. These include:

Issue Area	Accomplishment
Staff	TRNERR made progress in staffing by hiring a full complement of well-qualified, dedicated staff. Reserve staff have proven a critical resource in the progress that the reserve has made in program implementation. The strong collaboration between reserve and refuge staff is a fundamental component of both programs' success.
Facilities	TRNERR significantly upgraded its facilities through several important projects, including: (1) Visitors' Center renovation; (2) laboratory addition; (3) amphitheater construction; and (4) Goat Canyon enhancement.
Friends Group	The Friends of San Diego Refuges supported TRNERR by operating the reserve's retail shop, managing funds for special events, assisting with habitat cleanup and restoration projects and enhancing the reserve's visibility.
Partnerships and Program Coordination	TRNERR regularly engages in many diverse partnerships. The reserve successfully coordinates with federal, state, local, academic and private agencies and organizations.
System-wide Monitoring Program	With the addition of the research laboratory, the Research and Monitoring Program transferred all SWMP data processing and analysis to the reserve.
Restoration	The Research and Monitoring Program is a clear leader in estuarine restoration. The program initiated and facilitated several ambitious restoration projects during the review period.
Geographic Information System	TRNERR hired a full-time GIS Specialist who proactively works with the reserve's programs on a variety of innovative efforts. The application of GIS at the reserve has enhanced the precision and usefulness of data produced for ongoing projects.
K-12 Education and Professional Teacher Development	The Education and Outreach Program expanded its K-12 programming for students and professional development offerings for teachers. In particular, the Education and Outreach Program collaborated with its partners to develop the Tijuana Estuary High School Teachers' Guide, an innovative curriculum that is the only field-based estuarine science high school program in San Diego County.

Coastal Training Program	TRNERR hired its first CTP Coordinator, conducted the initial CTP planning phases and began implementation of the program. CTP fostered increased communication and understanding of key coastal issues among its target audiences. The program also effectuated change in decision-makers' behavior through a variety of workshops and innovative projects that comprehensively address the environmental, social and economic causes of coastal resource degradation.
Community Outreach	The Education and Outreach Program increased community outreach through participation in a variety of public events. In particular, the program put forth an outstanding effort to develop and host "Fiesta del Rio," a unique, engaging and highly-educational community celebration.
Education Advisory Committee	The Education and Outreach Program re-established a strong Education Advisory Committee composed of well-qualified, dedicated individuals.
Invasive Species Management	The Stewardship Program participated in an innovative, large-scale project designed to control giant reed, salt cedar and castor bean invasions in the Tijuana River Valley.
Predator Control	The Stewardship Program implemented a predator control effort to aid recovery of the light-footed clapper rail, California least tern, western snowy plover and least Bell's vireo. A public outreach campaign is a key element of the program's success.

In addition to the accomplishments listed above, the evaluation team identified several areas where the program could be strengthened. Recommendations are in the forms of one Necessary Action and eight Program Suggestions. Areas for program improvement include:

Issue Area	Recommendation
Reserve Management Authority	#1. PS: OCRM encourages TRNERR and the RMA to work together to refocus the RMA on its stated objectives, particularly on providing a forum for discussing complex issues. The reserve and the RMA should strongly consider shifting the emphasis of the RMA's quarterly meetings from agency reporting to problem solving around specific reserve issues.
Management Plan	#2. NA: TRNERR must finalize its revised management plan within one year of receipt of final evaluation findings. The status of the management plan revision must be described in TRNERR's semi-annual performance reports.
Facilities	#3. PS: OCRM recommends that all TRNERR staff participate in clearly defining current and future space requirements and how they might be met. In particular, the reserve should strongly consider: (1) expanding its laboratory; (2) adding a secure storage area; (3) adding a plant propagation area; and (4) improving site surveillance. During this exercise, staff should consider which, if any, space needs could be met offsite through partnerships.
Visibility	#4. PS: OCRM encourages TRNERR to continue raising its visibility throughout the San Diego region through signage, participation in public events and a variety of media.

Research Advisory Committee	#5. PS: OCRM strongly encourages the Research and Monitoring Program to reactivate and revitalize its RAC as soon as practicable.
Coastal Training Program	#6. PS: TRNERR should establish a distinct Watershed Coordinator position with responsibility for the reserve's watershed management and land-use programs. The CTP Coordinator position should focus on providing current scientific information and skill-building opportunities to coastal decision-makers.
Coastal Training Program	#7. PS: The Education and Outreach Program should engage its partners in an examination of the role of CTP north of the U.S.-Mexico border. Such an examination should consider: (1) the goals of a CTP northern component; (2) potential projects where CTP could add value; (3) the relationship of a CTP northern component to projects currently underway in Mexico; and (4) the feasibility of a CTP that addresses issues in both the United States and Mexico.
Volunteer Program	#8. PS: OCRM strongly encourages TRNERR to add a Volunteer Coordinator position to its staff and to formalize its Volunteer Program. The reserve should collaborate with USFWS to explore a jointly-funded position that would benefit both the reserve and the refuge. If such an arrangement is impossible, OCRM urges TRNERR to work with its partners to explore other options.
Invasive Species Management	#9. PS: OCRM encourages the Stewardship Program, in conjunction with its contributions to the invasive species management plan, to consider methods of further improving early detection and removal of invasive species at the reserve.

Appendix B. TRNERR Response to 2000 Evaluation Findings

1. Program Suggestion: CSP is encouraged to establish an Administrative Assistant position for the reserve to address clerical and record keeping needs. CSP is encouraged to explore funding options, including a jointly-funded position with USFWS. A status report on this effort should be included in each performance report and annual report submitted to OCRM.

CSP established an Office Technician position. The incumbent left the position in January 2006, and the position remained vacant as of April 2006. CSP intends to fill the position by October 2006. CSP may upgrade the position to Staff Services Analyst in order to better reflect the job complexities and to improve the candidate pool.

2. Program Suggestion: CSP is encouraged to take the necessary actions to establish a permanent, full-time Research Coordinator position, including state funding to support this position. State support for this position will ensure program stability for research and monitoring consistent with the requirements of the TRNERR management plan. A status report on these efforts should be included in each performance report and annual report submitted to OCRM.

A full-time Research Coordinator was added to the reserve staff during the review period. The Research Coordinator was hired by the Southwest Wetlands Interpretive Association, a cooperating association partner of CSP.

3. Necessary Action: TRNERR must prepare and submit annual reports pursuant to the guidelines presented in the standard operating procedures following the completion of every fiscal year of the State of California.

An annual report covering the year 2000 was completed in 2001. No annual reports were completed since. However, performance reports filed since that time give accurate updates on the status of the reserve, particularly those reports covering the annual operations grant.

4. Program Suggestion: CSP should consider moving the federal financial assistance award periods to correspond with the state's fiscal year start (July 1), thereby allowing for improved coordination and more efficient financial assistance management at the state and federal level.

The Federal Financial Assistance Award period has been moved to July 1.

5. Program Suggestion: The reserve should clarify and re-evaluate the role of the Education Advisory Committee, including the composition of its membership, meeting requirements, and program priorities. This should be coordinated with the existing revised management plan.

The Education Advisory Committee was revived in 2003. It developed a revised purpose as follows:

> The purpose of the Education Committee is to provide advice and ideas to the Education Department and to report to the Management Authority on activities of the Education Program via the Reserve Manager. The Committee will help the reserve fulfill NERR guiding principles of being a resource for environmental education within the entire watershed. The Committee will support the education and outreach goals of the region-wide Multiple Species Conservation Program and coordinate the reserve's environmental education programs with those of San Diego's South Bay in order to more efficiently deliver environmental field experiences to the greatest number of students.

The committee meets quarterly (typically). Members include representatives from the Friends of San Diego Wildlife Refuges, an elementary school teacher from South Bay District, two high school teachers from the Poseidon Academy at Mar Vista High School, USFWS Refuges Education and Information Specialists, and the County of San Diego Clean Water Program. The reserve is looking into possibly including more local NGOs. The priorities of the Education Advisory Committee are the priorities of the CMP and annual work plans of the Education Section.

6. Program Suggestion: The reserve should develop a strategy to take a greater role in formulating access strategies to geographic information system data that support activities of the reserve and Tijuana River Watershed. The result of the strategy would be to position the reserve to foster cooperative efforts in the watershed and elevate the reserve's visibility for resource planning and applied management practices. Future successes of this project could hinge greatly on the establishment and recruitment of a full-time, on-site Research Coordinator.

TRNERR now employs both a full time Research Coordinator and a full time Geographic Information System Specialist. As a result, reserve involvement in regional planning efforts has dramatically expanded.

7. Program Suggestion: The reserve should develop a strategy to better coordinate research and education activities to address key resource management issues. The reserve also should consider conducting an in-depth needs analysis for coastal decision-maker workshops that more effectively targets local, regional and state coastal issues.

The Research Coordinator and Education Coordinator started working at the reserve within months of each other (Coastal Training Program Coordinator as well). This is the first time in the history of the reserve that all the core positions are filled. A complete strategy has not been developed, but elements have been instituted to facilitate coordination and integration. The two Education Specialists spend up to one day a week assisting the Research Associates with the System-wide Monitoring Program and

biological monitoring. This allows the staff to understand the issues and concepts more deeply and has already carried over into education programming.

The main theme of the Ecology Section of the High School Teachers' Guide, invasive species, was decided in collaboration with the Research Coordinator.

The staff could work more closely together to mutually define goals and objectives.

8. Program Suggestion: The reserve is encouraged to continue with its plans for facility enhancements, including construction of the amphitheater, planning and construction for the Visitors' Center and other renovations to reserve-held facilities, as funding is available. Furthermore, the reserve should work with the Director of the San Diego State University Biological Field Station to explore options that may exist for planning and construction of a small research laboratory on-site.

The amphitheater and lab are complete. The Visitors' Center addition will be completed in Fall 2006. In addition, the Goat Canyon Sedimentation Basin project was completed in 2005. A complete remodeling of the Visitors' Center interior, using sustainable materials, was completed in March 2006. A shade system for the amphitheater and an exterior security system will be completed by Fall 2006. Expansion of the Operations Building will result in additional office space and is expected to be completed by December 2006.

9. Program Suggestion: TRNERR should develop a strategy to consolidate the various elements of the reserve's fragmented Volunteer Program, which includes training, recruitment and recognition. The reserve is encouraged to explore different avenues, including a jointly funded position with USFWS, by which a Volunteer Coordinator position could be created and added to the reserve staff.

In 2004, with the previous Reserve Manager, CSP and USFWS staff came together to try to solve the ongoing challenge of the Volunteer Program. After he left, the process was put on hold to focus on the Visitors' Center renovations. Originally, the reserve had a joint volunteer application for both agencies. Unfortunately, CSP changes its forms on a regular basis, rendering the old form obsolete. Currently, there are not sufficient funds to hire a Volunteer Coordinator.

Appendix C. People and Institutions Contacted

Tijuana River National Estuarine Research Reserve Representatives

Name	Title
Greg Abbott	Stewardship Coordinator
Marya Ahmad	Education Specialist
Casey Cody	Geographic Information System Specialist
Michelle Cordrey	Research Associate
Jeff Crooks	Research Coordinator
Ken Ghalambor	Coastal Training Program Specialist
Justin Hart	Intern
Jon Irwin	Park Ranger
Michael Kiener	Research Associate
Clay Phillips	Reserve Manager
Oscar Romo	Coastal Training Program Coordinator
Dave Schmoyer	Maintenance Specialist
Anne Marie Tipton	Education Coordinator
Toni Tyler	Administrative Assistant
Lorena Warner-Lara	Education Specialist

Federal Government Representatives

Name	Title	Affiliation
Slader Buck	Deputy Refuge Manager	USFWS - Tijuana Slough NWR
Brian Collins	Wildlife Biologist	USFWS - Tijuana Slough NWR
Debby Good	Ranger	USFWS – Tijuana Slough NWR
Tom Pokalski	Refuge Manager	USFWS – Tijuana Slough NWR
Barbara Simon	Information and Education Specialist	USFWS – Tijuana Slough NWR
Kathi Stopher		USFWS – Tijuana Slough NWR
Adan Cortez		USDHS – Border Patrol
Joshua Gough		USDHS – Border Patrol
Edward Parra		USDHS – Border Patrol
James Swanson	Special Operations Supervisor	USDHS – Border Patrol

State Government Representatives

Name	Title	Affiliation
Ronie Clark	District Superintendent	California State Parks
Rosario Cortes	Assistant Director for Legislation	California State Parks
Suzy Lahitte	Project Manager	California State Parks
Therese Muranaka	Archaeologist	California State Parks
Lisa Ortega	Accountant	California State Parks
Tony Perez	Division Chief	California State Parks
Paul Romero	Chief Deputy Director	California State Parks

Denise Ducheny	Senator	California State Senate
Jonathan Hardy		Office of Senator Ducheny
Karen Bane		California Coastal Conservancy
Ellen Lirley		California Coastal Commission

Local Government Representatives

Name	Title	Affiliation
Patricia McCoy	Council Member	City of Imperial Beach
James Nakagawa	City Planner	City of Imperial Beach
Yidelwo Asbu		County of San Diego
Jorge Hank Rhon	Mayor	City of Tijuana, Mexico
Miguel Angel Badiola Montano	Director of Public Relations	City of Tijuana, Mexico

Academic Representatives

Name	Title	Affiliation
Jason Liechter		Sweetwater Union High School District
Margarita Mogollon		
Aida Navarro	Wildlife Conservation Program Manager	WiLDCOAST
Mario Olmos	Director	Poseidon Academy
Keith Pezzoli		University of California at San Diego
Richard Wright		San Diego State University

Nongovernmental Organization Representatives

Name	Title	Affiliation
Fred Cagle	President	Southwest Wetlands Interpretive Association
Debby Carey	Administrator	Southwest Wetlands Interpretive Association
Michael McCoy	Vice President	Southwest Wetlands Interpretive Association
Mayda Winter	Project Manager	Southwest Wetlands Interpretive Association
Susan Fuller		Friends of San Diego Wildlife Refuges
Pat Wagner		Friends of San Diego Wildlife Refuges
Herb Young	Treasurer	Friends of San Diego Wildlife Refuges

Gale Moriarity	Vice President	Tijuana River Valley Equestrian Association
John Gabaldon		Tijuana River Valley Equestrian Association
Hiram Sarabia		Ja Jan Coalition
Anne McEnany	Sustainable Communities Director	International Community Foundation
Suzanne Michael		Wetland Recovery Program
Shara Fisler		Aquatic Adventures

Other Representatives

Name	Title	Affiliation
Dennis Bowling	Engineer	Rick Engineering
Chris Norby	Consultant	
Carlos Pena		International Boundary and Water Commission
Tessa Roper	Consultant	

Appendix D. Public Meeting Attendees

Name	Affiliation
Gary Brown	City of Imperial Beach
Slader Buck	USFWS – Tijuana Slough NWR
Joe Ellis	Resident
Susan Fuller	Friends of San Diego National Wildlife Refuges
Fred McLean	City of Imperial Beach
Jim Nakagawa	City of Imperial Beach
Mayda Winter	Southwest Wetlands Interpretive Association

Appendix E. OCRM's Response to Written Comments

OCRM did not receive any written comments regarding the Tijuana River National Estuarine Research Reserve during the course of the evaluation.