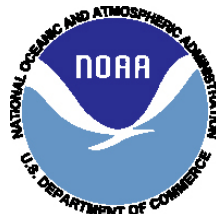


## Final Evaluation Findings

### Jobos Bay National Estuarine Research Reserve

December 2001 through December 2005



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

Jobs Bay National Estuarine Research Reserve  
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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 Jobos Bay National Estuarine Research Reserve (JBNERR) during the period of December 2001 through December 2005. The Puerto Rico Department of Natural and Environmental Resources (DNER) administers JBNERR.

This document describes the evaluation findings of the OCRM Director with respect to JBNERR 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 DNER is successfully implementing and enforcing the federally-approved JBNERR.

The evaluation team documented a number of JBNERR's accomplishments during the review period. JBNERR made significant progress in staffing by filling several positions with highly-qualified individuals. The reserve maintained strong Geographic Information System (GIS) capabilities and enhanced its excellent GIS database. The Education and Outreach Program expanded its K-12 programming. JBNERR hired its first Coastal Training Program (CTP) Coordinator, completed the initial CTP planning phases and began implementation of the program. JBNERR and DNER made considerable progress toward halting resource degradation on the reserve's western boundary in the vicinity of Camino del Indio and Las Mareas. The reserve and DNER have overseen efforts to address black mangrove degradation on the northern boundary. JBNERR successfully acquired all five parcels of land identified in its 2001 acquisition plan. DNER initiated a comprehensive interagency stewardship agreement regarding permitting, monitoring and enforcement at the reserve. No new enforcement issues have occurred at the reserve since the agreement was signed.

The evaluation team also identified areas where the reserve and its programs could be strengthened. OCRM's recommendations are in the forms of two Necessary Actions and ten Program Suggestions. Necessary Actions focus on the reserve's needs to: (1) revise its management plan; and (2) continue addressing remaining resource issues in Camino del Indio and Las Mareas. Program Suggestions address staffing, facilities, outreach, visibility and stewardship.

## II. PROGRAM REVIEW PROCEDURES

### A. OVERVIEW

NOAA's Office of Ocean and Coastal Resource Management (OCRM) began its review of the Jobs Bay National Estuarine Research Reserve (JBNERR) in October 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 Puerto Rico including interviews and a public meeting;
- Development of draft evaluation findings; and
- Preparation of final evaluation findings, partly based on comments from the commonwealth 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 JBNERR. 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, the Puerto Rico Department of Natural and Environmental Resources (DNER) 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 JBNERR.

### B. DOCUMENT REVIEW AND ISSUE DEVELOPMENT

The evaluation team reviewed a wide variety of documents prior to the site visit, including: (1) the 2002 JBNERR final evaluation findings; (2) the federally-approved

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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 Puerto Rico.

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

- JBNERR's major accomplishments during the review period;
- Status of JBNERR's general administration, including grants, financial management and staffing;
- Status and visibility of research, monitoring, 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 JBNERR's coordination with other federal, commonwealth and local agencies;
- JBNERR's role with local communities and its integration with partners; and
- The manner in which JBNERR and DNER have addressed the recommendations contained in the evaluation findings released in 2002. JBNERR's assessment of how it has responded to each of the recommendations in the 2002 evaluation findings is located in Appendix B.

### **C. SITE VISIT TO JBNERR**

Notification of the scheduled evaluation was sent to DNER, JBNERR, relevant federal regulatory and environmental agencies, Puerto Rico's Resident Commissioner and regional newspapers. In addition, a notice of OCRM's "intent to evaluate" was published in the Federal Register on December 23, 2005.

The site visit to Puerto Rico was conducted from January 30 through February 3, 2006. Mr. Ralph Cantral, Evaluation Team Leader, OCRM National Policy and Evaluation Division Chief; Ms. Rosemarie McKeeby, Evaluator, OCRM National Policy and Evaluation Division; and Ms. Nina Garfield, JBNERR Specialist, OCRM Estuarine Reserves Division composed the evaluation team.

During the site visit, the evaluation team interviewed JBNERR staff, senior DNER officials, and representatives from other commonwealth agencies, federal agencies, local governments, nongovernmental organizations, community groups, academia and research institutions. Appendix C lists people and institutions contacted during this review.

As required by the CZMA, OCRM held an advertised public meeting on February 1, 2006, at 5:00 p.m., at the JBNERR Visitors' Center, Road 705, Kilometer 2.3, Main Street, Aguirre, Puerto Rico. The meeting gave members of the general public the opportunity to express their opinions about the overall operation and management of JBNERR. Appendix D lists individuals who registered at the meeting. OCRM's

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response to written comments submitted during this review is summarized in Appendix E.

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

### III. RESERVE PROGRAM DESCRIPTION

NOAA's Office of Ocean and Coastal Resource Management (OCRM) designated the Jobos Bay National Estuarine Research Reserve (JBNERR) in 1981. The Puerto Rico Department of Natural and Environmental Resources (DNER) is the administrative lead agency for the reserve. As such, DNER provides matching funds for OCRM financial assistance awards and is responsible for JBNERR's operations and management. JBNERR is positioned within DNER's Bureau of Coasts, Reserves and Refuges, part of the department's Natural Resources Administration.

JBNERR is located within the municipalities of Guayama and Salinas on the southern coast of Puerto Rico. The reserve comprises approximately 2,800 acres of coastal wetland and subtidal habitats representative of the West Indian biogeographic region. Three coastal habitats of particular ecological and economic significance are found within JBNERR's boundaries: (1) mangrove forests, (2) seagrass beds, and (3) coral reefs. These habitats form a very complex, diverse and productive coastal association that provides unique opportunities for environmental research and education.

Dense stands of mangroves occur along the reserve's mainland shoreline and the Cayos Caribe islands. Mangroves slow water movement and trap suspended materials, gradually raising the ground level and producing organic soil. The rich, protected substrate provides habitat for a great variety of marine life, including several species of commercially-valuable finfish and shellfish. Mangroves also supply nesting sites for native and migratory birds.

Many of JBNERR's shallow waters are dominated by seagrass bed communities. Seagrass beds serve as habitat, feeding and nursery grounds for conch, octopus, squid, shrimp and juvenile lobster. Additionally, the endangered hawksbill sea turtle, green sea turtle, and West Indian manatee have been observed in the reserve's seagrass beds.

JBNERR is the only site in the National Estuarine Research Reserve System that contains a representative example of an offshore Caribbean coral reef. The reserve's corals display the typical zonation of Caribbean reefs. Finger corals, gorgonians, zoanthids and seagrass beds characterize the scoured channels between the Cayos Caribe islands. Like many reef communities found in southern Puerto Rico, communities located off Cayos Caribe exhibit relatively low diversity and abundance and tend to be dominated by massive scleractinian corals, gorgonian octocorals and algae.



## IV. REVIEW FINDINGS, ACCOMPLISHMENTS AND RECOMMENDATIONS

### A. OPERATIONS AND MANAGEMENT

#### 1. Staff

Reserve staff are responsible for the Jobs Bay National Estuarine Research Reserve's (JBNERR) on-site development and daily operations and management. During the review period, JBNERR experienced a relatively high rate of staff turnover, which slowed the momentum of its core programs. At the end of the review period, however, the reserve made significant progress in staffing by filling several positions with highly-qualified individuals. Staff at the time of the site visit included the Acting Reserve Manager, Research Coordinator, System-wide Monitoring Program (SWMP) Technician, Education Coordinator, Education Specialist, Coastal Training Program (CTP) Coordinator, Administrative Assistant and Maintenance Specialists. The staff's commitment to and enthusiasm for their work were evident throughout the site visit. Staff also have a strong vision for the future of the reserve. Their vision incorporates a watershed focus and a link to ecotourism as one means of involving the community in resource management while providing economic opportunity for residents.

**Accomplishment: JBNERR made significant progress in staffing by filling several positions with highly-qualified individuals. The staff is committed and enthusiastic and has a strong vision for the future of the reserve.**

JBNERR's new staff will be a major asset to the reserve as its key programs regain momentum and move forward. However, as core programs begin to grow, additional staff will be required to implement them fully. Existing vacancies at the reserve include the Stewardship Coordinator and Geographic Information System (GIS) Specialist, both important positions. NOAA's Office of Ocean and Coastal Resource Management (OCRM) encourages the Puerto Rico Department of Natural and Environmental Resources (DNER) to fill these positions as soon as possible and to work with JBNERR to identify additional staffing needs that may arise as the reserve's programs mature. In order to minimize future staff turnover, DNER and JBNERR should explore methods for retaining qualified staff, such as ensuring that all reserve positions are properly classified.

One of the National Estuarine Research Reserve System's (NERRS) partnership goals is that the lead agency will provide funding for core staff<sup>1</sup> at each reserve. JBNERR's core staff, as well as several other positions, are entirely supported by the OCRM annual operations award. OCRM acknowledges that the Commonwealth of Puerto Rico, like many states participating in the reserve system, is facing difficult financial times. However, reserves that receive consistent staff support from their lead agencies tend to be better positioned to make significant progress in program implementation, to undertake

<sup>1</sup> Reserve Manager, Research Coordinator and Education Coordinator.

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new initiatives and to respond to challenges. DNER should begin providing commonwealth support for JBNERR's core staff. Even a phased approach that begins with support for one core staff person would be an improvement over the current situation.

**1. Program Suggestion: OCRM strongly encourages DNER and JBNERR to: (1) fill current staff vacancies; (2) identify staffing needs that may arise as the reserve's programs mature; (3) explore methods to retain qualified staff; and (4) provide consistent, long-term support for the reserve's core staff.**

## **2. 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, and restoration. Additionally, the plan is required to describe staff roles in each of these areas.

JBNERR's revised management plan, reflecting the reserve's vision and strategy for 2006-2010 was due in 2005. During the site visit, it was evident to the evaluation team that it was an opportune time for the reserve to revise its management plan. Many of the evaluation discussions focused on topics that are properly addressed in a revised management plan, such as facilities development, energy planning, boundary expansion, monitoring program enhancements, community involvement, advisory committee functions and communication strategies. At the time of the site visit, however, JBNERR had not yet developed a process for revising the management plan, established a management plan workgroup or directed funds<sup>2</sup> to this mandatory task.

**2. Necessary Action: Within one month of receipt of final evaluation findings, JBNERR must submit a strategy and timeline for revising its management plan to OCRM. Once the strategy and timeline are complete, JBNERR must provide updates on the management plan's revision process in its semi-annual performance reports. The revised plan must be completed by March 2008.**

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<sup>2</sup> Following the evaluation site visit, JBNERR identified revision of the management plan as a task in its FY 2006 operations award.

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### **3. Facilities**

JBNERR's Visitors' Center houses laboratory facilities, an information and resource library, a conference room that doubles as a theater, and administrative offices. A 2,800 square-foot space in the Visitors' Center is devoted to interpretive exhibits that were refurbished during the review period. The exhibits include interactive displays, photos, a watershed model and coral reef dioramas. Pictorial exhibits provide overviews of JBNERR's key ecosystems, resources and the cultural history of Aguirre. A dormitory with capacity for sixteen is located adjacent to the Visitors' Center. The reserve also features two hiking trails and one kayak trail, each of which is complemented with interpretive signs.

During the review period, JBNERR acquired several critical parcels of land, a significant accomplishment. However, the addition of the property also transferred responsibility to the reserve for several associated facilities. Two abandoned buildings are located on the newly-acquired parcel of land behind the Visitors' Center. One of the buildings is a large, dilapidated barn-like structure that may be structurally unsound. The reserve's boundary actually bisects the building, and the Puerto Rico Land Authority (PRLA), the previous landowner, continues to claim ownership of the structure. Given the building's exceedingly poor condition, JBNERR may wish to consider removing it once the ownership issues with PRLA are resolved. The other abandoned building on the parcel is a large garage that appears to be in relatively good structural condition, but it contains old machinery, trash and barrels filled with unidentified substances. A comprehensive cleanup effort at the site is required. Following cleanup of the site, the reserve will need to decide whether to retain the structure or to demolish it. The garage may have value as a storage site for boats, particularly during severe weather. Another newly-acquired property adjacent to the Visitors' Center contains the concrete frame of an abandoned hotel. JBNERR and DNER have discussed several ideas for the hotel.

**3. Program Suggestion: As part of its management plan revision, JBNERR should develop a comprehensive facilities plan that assesses its current facilities and its future facilities needs. The reserve's core mission and its capacity should be an integral component of the plan. The plan should describe the pros and cons of refurbishing and maintaining the abandoned structures versus demolishing them; it also should provide detailed cost projections for each option. Additionally, the plan should incorporate sustainable design principles and an energy strategy that examines the potential for generating solar and wind power.**

During the review period, JBNERR received a construction award to build a new pier. Project delays resulting primarily from permitting issues led the reserve to request several extensions of the award. At the time of the evaluation site visit, construction had yet to begin on the pier, and the reserve was trying to resolve a permitting mix-up with the U.S. Army Corps of Engineers (USACE). JBNERR is in danger of losing the construction funds if the pier is not completed by December 2006. OCRM recognizes that some of the contributing factors to construction delays were out of the reserve's control. However,

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OCRM strongly encourages JBNERR to work toward resolution of those issues that are hampering the timely completion of construction tasks as soon as possible.

#### **4. Financial Management**

In general, JBNERR achieved the desired results from funded tasks and built upon established projects during the review period. However, the reserve had to return a significant amount of the funding from one of its operations awards to OCRM. This occurred because the reserve was unaware that it had not spent all of its allocated funding by the end of the award period. Improved communication and coordination between DNER and JBNERR regarding financial management should minimize such oversights in the future. For example, the DNER Financial Officer responsible for the reserve and the JBNERR Acting Manager should consider instituting quarterly meetings to discuss the status of open awards. At a minimum, the Financial Officer and Acting Manager should meet at least four months prior to the end of each award to determine whether all funds are on track to be fully expended or whether a no-cost extension or reprogramming is required.

Upon receipt of an OCRM operations or construction award, a reserve is required to submit semi-annual performance reports describing the status of each award task. Performance reports are useful both to OCRM and to the reserve because they provide a consolidated source of information on accomplishments related to financial assistance awards. During the review period, JBNERR's performance reports were submitted on schedule and provided necessary information.

JBNERR continues to lack small purchases capability. The reserve does not have a department credit card, petty cash fund, or credit accounts with vendors, and DNER will not prepare a purchase order for an amount less than \$50 dollars. Therefore, many of the reserve's small purchases become out-of-pocket expenditures for staff. OCRM recommends that DNER work with JBNERR to provide small purchases capability, such as a department credit card or petty cash fund, for the reserve.

#### **5. Partnerships**

JBNERR coordinates well among reserve programs and with external partners. The reserve's staff collaborate with and assist one another with program planning and implementation, resulting in the integration of JBNERR's core programs. During the site visit, the evaluation team was pleased to see key linkages among the programs that are essential to the reserve's mission. JBNERR also emphasizes coordination with external partners such as the Puerto Rico Coastal Management Program (PRCMP), Puerto Rico Sea Grant, University of Puerto Rico, commonwealth agencies, municipal governments and local communities. OCRM recognizes JBNERR for its coordination among its core programs and external partners and encourages it to continue and to enhance such efforts.

## **B. RESEARCH AND MONITORING PROGRAM**

### **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 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 reserves 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 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 of 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.

JBNERR's Research and Monitoring Program deploys four data loggers that measure depth, pH, temperature, conductivity, salinity, dissolved oxygen and turbidity. Staff retrieve, clean, calibrate and reposition the data loggers on a regular basis. During the review period, the Research and Monitoring Program expanded SWMP to include measurements of nutrient and chlorophyll gradients in Jobs Bay. Staff collect monthly grab samples at each of the data logger sites and send them for processing and analysis. An automated weather station in front of the Visitors' Center compiles data on air

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temperature, relative humidity, barometric pressure, rainfall, and wind speed and direction at 15-minute intervals. The Research and Monitoring Program submits all water quality and weather data to the CDMO at Baruch Marine Laboratory in South Carolina for inclusion in the NERRS database.

At the time of the evaluation site visit, the Research and Monitoring Program was planning to further expand SWMP by adding two new data logger sites and a new weather station near Mar Negro. Staff also discussed opportunities for establishing biomonitoring of the reserve's coral and seagrass populations. OCRM encourages the Research and Monitoring Program to continue expanding SWMP as feasible, particularly in areas that support significant research topics at the reserve. Any such expansion should be explored in the context of the reserve's management plan revision.

## **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 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. Each reserve is provided funding to support up to two fellows at a time, and 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.

JBNERR's Research and Monitoring Program supported several GRFs during the review period. Examples of GRF projects at the reserve include, "Distribution and control of sea grasses in Jobos Bay by nutrients and manatees," and "An integrated approach towards understanding the density, distribution and size structure of *Cardiosoma guanhumi* in two estuaries in Puerto Rico." The evaluation team met with one of JBNERR's current GRFs who provided an overview both of her research as well as her experience as a GRF at the reserve. She noted that the Research and Monitoring Program was very supportive of her research and that it had an excellent database to offer researchers. For example, the database provided her with the information necessary to conduct a detailed spatial analysis to model land crab habitat and to determine the ecological parameters that define the crabs' extent.

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The GRF Program is an important component of JBNERR's Research and Monitoring Program that provides a good opportunity to engage graduate students in research at the reserve. However, the GRF Program has low visibility in Puerto Rico. It appears that few prospective candidates for the program are aware of its existence. Additionally, the evaluation team heard that it was hard to excite much interest in the program given that the reserve can only support a maximum of two GRFs at a time and each GRF may be funded for up to three years; i.e. JBNERR is unable to accept new fellows every year. The Research and Monitoring Program staff and the evaluation team discussed the need to improve the visibility of the GRF Program in order to continue attracting high-quality student researchers to the reserve.

**4. Program Suggestion: The Research and Monitoring Program should work in concert with JBNERR's Research Advisory Committee (RAC) and Education and Outreach Program to increase awareness about GRF opportunities at JBNERR. Efforts should be made to publicize the program not only in Puerto Rico, but also throughout the wider Caribbean in order to enhance and diversify the program's applicant base.**

### **3. Geographic Information System**

During the review period, JBNERR maintained and enhanced its GIS Program. The reserve's GIS capabilities provide tools for managing geographical data and afford an opportunity for cooperative projects in resource management, planning, restoration and education. One of the program's key products is an excellent GIS database. Jobos Bay's high-resolution GIS layers have been classified into eight categories: (1) administrative boundaries; (2) biodiversity; (3) census; (4) environmental; (5) land use; (6) topographic; (7) transportation; and (8) water resources. The database includes 2002 satellite imagery of all Puerto Rico and 2004 satellite imagery of the reserve. Staff also incorporated high-resolution imagery for the Jobos Bay Watershed's infrastructure and land use in 1972, 1990, 2000 and 2002 into the reserve's database.

**Accomplishment: JBNERR maintained strong GIS capabilities and enhanced its excellent GIS database. The application of GIS at the reserve has improved the precision and usefulness of data produced for ongoing projects.**

In the past, the reserve's GIS Program and PRCMP exchanged data layers that were applied to monitoring, cumulative impact analysis and land use planning. PRCMP is a leader in GIS development among commonwealth agencies and programs and continues to explore opportunities to expand the innovative application of GIS technology throughout DNER. Given the obvious links between the reserve and the coastal program and their common strength in GIS application, OCRM encourages JBNERR's and PRCMP's GIS Programs to collaborate regularly on issues of mutual interest such as resource stewardship and ecotourism.

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#### **4. Research Advisory Committee**

Almost every reserve in the NERRS has a RAC to help guide its Research and Monitoring Program. 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.

JBNERR's RAC is composed of enthusiastic, highly-qualified researchers that have conducted interesting and relevant research at the reserve. However, the Committee has interacted primarily through informal communications and meetings. Members have tended to work on their own projects directly with the reserve. The next step for the RAC is to become a more integrated working group. During the site visit, members noted the need to broaden the Committee's expertise and responsibilities as well as the need to begin working collectively in an advisory capacity. For example, the Committee should include experts in corals and seagrasses. The evaluation team and the RAC discussed the need to develop long-term research priorities that address emerging issues at the reserve. Committee members also commented that the reserve would benefit from a comprehensive ecosystem-based monitoring plan that includes corals, seagrasses, ocean hydrodynamics and air quality. The RAC could also serve as a resource for students who are interested in working at the reserve and need to find funding to support their research. For example, the Committee could help to publicize the GRF Program as well as other funding opportunities.

Given that JBNERR currently has a new, full-time Research Coordinator and is due to revise its management plan, it is appropriate for the Research and Monitoring Program and the RAC to consider expanding the Committee's membership and re-focusing its mission. In addition to the duties described above, a well-institutionalized 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 Jobos Bay Watershed; and
- Offering advice on opportunities for developing cooperative research and monitoring agreements.

**5. Program Suggestion: The Research and Monitoring Program and the RAC should work together to move the Committee toward a more formal, integrated working group. The RAC should consider broadening its expertise and responsibilities and should begin working collectively in an advisory capacity. In particular, the Committee should develop long-term research priorities that address emerging issues at the reserve.**



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## **5. Information Transfer**

The Research and Monitoring Program initiated and facilitated many interesting projects during the review period. Examples include:

- Assessment of nitrate contamination in the Salinas area;
- Contingency plan for an oil spill in a mangrove area of JBNERR;
- Heavy metals and biomarkers toxicity assays in JBNERR;
- Evaluation of nonpoint source discharges and their effect on water quality and nutrients in the community of Las Mareas;
- Impact of mangrove removal on adjacent coral reefs in terms of energy flow, algal growth and changes in coral and macroalgal cover; and
- Habitat use and seasonal distribution of shorebirds at JBNERR.

The evaluation team was impressed with both the quantity and the quality of research underway at JBNERR. However, in order for the research to be truly useful, the results must be regularly provided to and interpreted for local decision-makers and the public. JBNERR staff and the evaluation team discussed a variety of methods that the Research and Monitoring Program could employ in order to improve the dissemination and translation of its research. For example, the reserve should compile a research library available both in hard copy and electronic formats. Such a compilation will likely be a large and time-consuming task and may best be accomplished through a phased approach. Staff could first include the final papers of all research conducted at JBNERR. They then may wish to include research from the larger Jobos Bay Watershed and relevant research from elsewhere on topics of interest to the reserve, such as coral reef management, ecotourism and seagrass restoration. At some point, the Research and Monitoring Program could produce “research briefs” that summarize each completed research project and its importance to coastal ecology and management.

One of the reserve’s operations award tasks for the review period stated that the reserve, in conjunction with the San Juan Bay National Estuary Program, would sponsor an Estuarine Research Symposium. Such a symposium would highlight both programs’ research projects through integrated issue sessions. Unfortunately, the symposium was not held. However, the evaluation team noted that such an effort would be an important step in transferring the reserve’s research to a larger audience. JBNERR research staff might also considering hosting “Meet the Scientist” open house events. The Research Coordinator should collaborate with the Education Coordinator and the CTP Coordinator to achieve optimal dissemination and translation of the reserve’s research to local decision-makers and the public. Introducing the community to the Research and Monitoring Program through creative events will enhance individuals’ understanding of the reserve and its research.

## C. EDUCATION AND OUTREACH PROGRAM

### 1. K-12 Education

JBNERR's Education and Outreach Program provides strong K-12 education programs. School groups from throughout Puerto Rico often tour the reserve; in fact, students compose the majority of JBNERR's visitors. Education staff give presentations about stewardship and conservation of the reserve, and the students participate in educational field trips and activities designed to raise their environmental awareness.

The reserve's regular K-12 programming intensifies each year around National Estuaries Day, an interagency celebration that takes place each September.<sup>3</sup> JBNERR welcomed more than 70 visitors, mainly local elementary school students, during National Estuaries Day in 2004. The day's events included educational workshops on topics such as coral reefs and recycling. The students also participated in two field trips. The first trip guided the participants through the historical Town of Aguirre, home to an old sugar mill and plantation. The second field trip engaged the students in bird-watching activities at the reserve.

During the review period, the Education and Outreach Program organized a photo contest that serves as a good example of the reserve's innovative efforts to interest students in stewardship and conservation. Forty-seven seventh-grade students from ten schools in the municipalities of Salinas and Guayama were invited to explore the reserve's Jagueyes Forest Trail with their cameras. Twelve of the photos were subsequently featured in a reserve calendar.

In July 2005, the Education and Outreach Program held its first summer camp for 24 students between the ages of 12 and 17 from the communities of Aguirre, Guayama and Arroyo. The campers, dubbed "Guardians of the Estuary," spent five days at the reserve from 8:00 a.m. to 3:00 p.m. The students learned about the reserve's mangroves, coral reefs and seagrass beds through educational workshops and interpretive walks along the Jagueyes Forest and Cayos Caribe trails. Educational videos and discussions about protecting the reserve's environment complemented other camp activities. At the time of the evaluation site visit, another week of "Guardians of the Estuary" summer camp, designed to build upon the 2005 session, was planned for July 2006.

**Accomplishment: The Education and Outreach Program expanded its K-12 programming. In particular, education staff engaged students in stewardship and conservation of the reserve and its resources through innovative efforts such as special programming for National Estuaries Day, a reserve photo contest and calendar, and a "Guardians of the Estuary" summer camp.**

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<sup>3</sup> National Estuaries Day began as part of an effort to educate the public on the importance of estuaries and the need to protect them; the celebration has matured into a national campaign with festivities around the country.

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During the evaluation site visit, the Education and Outreach staff described potential next steps for the program's K-12 education efforts. Staff noted that they would like to improve and broaden their collaboration with public schools. They also discussed developing an education curriculum. The evaluation team agreed that these were logical next steps in the K-12 education program's development and encouraged the staff to undertake such efforts as practicable.

**6. Program Suggestion: OCRM encourages the Education and Outreach Program to develop an education curriculum that: (1) further promotes experiential learning about Jobs Bay's valuable natural and cultural resources; (2) aligns with commonwealth educational content standards; (3) targets local students and teachers; and (4) incorporates the reserve's research and monitoring projects.**

## **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, JBNERR hired its first CTP Coordinator. Staff formed a CTP Advisory Committee,<sup>4</sup> completed the initial CTP planning phases and began implementation of the program. The CTP market analysis and needs assessment identified four critical gaps:

- A lack of understanding about coastal planning processes;
- A lack of knowledge about environmental legislation and regulations pertaining to planning and development;
- A lack of proper planning tools for soil and water conservation plans; and
- A lack of efficient erosion control management plans and practices at construction sites.

Consequently, the CTP Advisory Committee selected several thematic areas in which to begin building CTP capacity: (1) land use planning; (2) sustainable use of coastal resources; (3) integrated coastal zone management; (4) environmental legislation; and (5) wetlands and watershed protection. JBNERR's coastal decision-maker workshops were based on these five topics. Examples of workshops offered during the review period include:

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<sup>4</sup> The Advisory Committee includes representatives from JBNERR, PRCMP, DNER and Sea Grant.

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- How to complete the joint permit application for water resource alterations;
- Basic elements for the development of a soil conservation plan;
- Soil erosion and sediment control; and
- Environmental regulations and legislation.

**Accomplishment: JBNERR hired its first CTP Coordinator, completed the initial CTP planning phases and began implementation of the program. CTP held successful coastal decision-maker workshops on key coastal issues, fostering increased communication and understanding among its target audiences.**

In December 2005, JBNERR's CTP Coordinator resigned. Subsequently, one of the CTP Advisory Board representatives from Sea Grant assumed the responsibility of completing program reports and other related activities. She was then hired as a half-time CTP Coordinator for the reserve.

Given that the reserve has a new CTP Coordinator, it is appropriate to assess the current status of and future directions for the program. During the site visit, the evaluation team, education and outreach staff and Sea Grant discussed the future of CTP at JBNERR. The CTP Coordinator noted that the Advisory Committee needs to be reinvigorated and augmented with local community representatives. She also cited revision of the program's strategic plan and diversification of its delivery methods as important next steps. Given the amount of work that will be required to move the CTP forward into its next phase of reassessment and new initiatives, the reserve should transition the CTP Coordinator into a full-time position.

**7. Program Suggestion: OCRM encourages the Education and Outreach Program to: (1) reinvigorate and augment the CTP Advisory Committee with local community representatives; (2) revise the CTP strategic plan; (3) diversify the program's delivery methods beyond workshops; and (4) transition the CTP Coordinator into a full-time position.**

JBNERR has a good relationship with Puerto Rico Sea Grant, and it was most evident during the CTP discussions. The Sea Grant Director evidenced considerable enthusiasm for the program and its potential role in community revitalization. For example, he noted that the reserve can help the local community develop a vision for the future through CTP. The program might also assist the community to achieve that vision through awareness and implementation of smart growth principles. The Sea Grant Director also described the possibilities for CTP to increase understanding of how conservation and sustainability can translate into economic and social benefits for the community. He concluded that the local community, through the efforts of CTP, could become a showcase for sustainable community revitalization. The evaluation team agreed that such a direction: (1) was a logical one for the program given the local community's challenges; and (2) would nicely complement and enhance existing outreach efforts.

### 3. Community Outreach

JBNERR's 2002 final evaluation findings cited a community survey that revealed the majority of the surrounding community recognized the reserve as part of DNER, but it did not fully understand its purpose. The survey also indicated that the community was faced with several difficult social and economic problems that are linked to the environment. During the current review period, the Education and Outreach Program began to work with the local community to address some of its environmental problems and to raise awareness of the reserve and its role. For example, staff presented several seminars and workshops about the sustainable development of ecotourism microindustries to local communities. One of the communities that the reserve worked with was Las Mareas, a designated "Special Community."<sup>5</sup> A group of approximately 14 community leaders and residents from Las Mareas notified the reserve that they were interested in establishing an ecotourism business. In 2005, the Education and Outreach Program provided four days of training for the group centered on birdwatching and natural area interpretation. The first day of the training focused on presentations about the reserve's ecosystems. The group took field trips to a dry forest, mangroves and salt flats on the next day. During the third day of training, the participants practiced their interpretive skills with area school groups. The training concluded with a field trip to Cayos Caribe where the group participated in an interpretive walk and island clean-up.

Staff also continued outreach to public schools, colleges and businesses during the review period. They participated in various environmental fairs and distributed outreach materials promoting the reserve's programs and facilities. Staff also attended special events, such as a kayak competition that was organized by the Guayama Fishing Association. Educational material about the reserve and Cayos Caribe was distributed during the competition. OCRM recognizes JBNERR for its outreach to the local community and encourages it to continue and to enhance such efforts. For example, the reserve could consider strengthening its relationship with a local newspaper, radio station or television station that might run information about education programs, research projects and upcoming events at the reserve.

**8. Program Suggestion: JBNERR should continue to strengthen its visibility locally and regionally through outreach to area municipalities, Special Communities, relevant commonwealth agencies, researchers, educators and the general public.**

### 4. 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, including:

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<sup>5</sup> The Puerto Rico Special Communities Trust Fund and Initiative was launched in 2002. It officially allocated \$1 billion to improve the living conditions of poor families in hundreds of communities island-wide.

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- 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 communication and information exchange between the reserve and other groups.

During the previous review period, JBNERR had an EAC that was composed of talented and committed individuals who played an important role at the reserve. However, with the lack of a consistent, full-time Education Coordinator in the current review period, the EAC became inactive. Given that JBNERR now has a full-time Education Coordinator and is undergoing a revision of its management plan, it is appropriate for the Education and Outreach Program to reactivate and revitalize its EAC. During the site visit, the evaluation team met with a number of enthusiastic educators who worked with the reserve and appeared to be a good candidate pool for a new EAC.

<p><b>9. Program Suggestion: OCRM strongly encourages the Education and Outreach Program to reactivate and revitalize its EAC as soon as practicable.</b></p>
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#### **D. STEWARDSHIP PROGRAM**

In 2001, an evaluation team found that illegal encroachments, impacts from unlawful diking and channelizing activities, and development pressures in and adjacent to JBNERR had considerably degraded reserve resources and adversely affected the water quality of the estuary. At that time, permitting and enforcement efforts were largely ineffective in addressing the reserve's resource problems. Given the duration and severity of the resource degradation, JBNERR's 2002 final evaluation findings registered serious concerns about the future of the reserve if such trends were to continue.

As a result of JBNERR's and DNER's leadership and concerted efforts to address the 2002 final evaluation findings, they made considerable progress toward halting resource degradation at the reserve during the current review period. JBNERR and DNER collaborated with a wide variety of partners, including many commonwealth agencies, in order to improve stewardship and resource management in the Jobs Bay Watershed. OCRM recognizes JBNERR and DNER for significant progress in the area of stewardship during the review period. Specific accomplishments in critical areas are described in the following sections.

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## **1. Camino del Indio and Las Mareas**

At the time of the 2001 evaluation site visit, JBNERR was facing longstanding illegal construction around and within the reserve, principally in the areas of Camino del Indio and Las Mareas. Unpermitted structures, both on land under contested ownership and on land owned by the commonwealth continued to be built. Existing illegal structures continued to expand through additions. Frequently, the Puerto Rico Electric Power Authority and the Puerto Rico Aqueduct and Sewer Authority provided these structures with electricity and running water. Over time, numerous incidences of illegal construction, fill and road paving prevented water exchange between Mar Negro Lagoon and the Caribbean Sea, diminishing water quality. As a result, habitat mortality increased rapidly, including mangrove loss.

As required by the 2002 final evaluation findings, JBNERR and DNER initially developed a recovery action plan to address the problems at Camino del Indio and Las Mareas. During a site visit by OCRM staff in August 2004, DNER and OCRM agreed upon several actions, each with an identified timeline and responsible individual, needed to complete the outstanding requirements of the 2002 final evaluation findings:

- 1) JBNERR will mark the boundary of the reserve in the areas of Camino del Indio and Las Mareas with posts that are visible to the public and to enforcement personnel. The reserve will undertake a corresponding public outreach effort so that the community understands the need for the markers;
- 2) DNER will convene a coordination meeting among the Federal Emergency Management Agency (FEMA), PRCMP, JBNERR, mayors and/or planning representatives of the municipalities of Salinas and Guayama, and Sea Grant to ensure that FEMA funds are not directed to rebuild structures within the reserve's boundary in the aftermath of a natural disaster;
- 3) DNER will codify in writing the process for coordinating the enforcement efforts of the Ranger Corps, DNER Legal Division and USACE. This process will include regular meetings to facilitate communication and collaboration;
- 4) DNER will research the status of the court-ordered injunction preventing construction and enhancements in Camino del Indio and Las Mareas. JBNERR and DNER will ensure that no new structures or structural enhancements are built in Camino del Indio and Las Mareas pending the outcome of the court case to resolve title issues. DNER will coordinate with relevant permitting and utility agencies as appropriate.

The evaluation team was very pleased that JBNERR and DNER completed each of the actions described above prior to the evaluation site visit. DNER surveyors completed the official survey of the reserve, and staff marked the boundary with posts and signs at Camino del Indio, Las Mareas, Mar Negro and the newly-acquired parcel in Aguirre. Staff also informed the community of Las Mareas about the need for the boundary markers. PRCMP convened a coordination meeting with relevant agency stakeholders from around the island to discuss permitting and enforcement issues at the reserve. Specific enforcement staff were assigned to the reserve and were provided a single point

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of contact in the DNER Legal Division with whom to work with on enforcement actions. As a result, the Rangers and the Legal Division submitted 19 complaints regarding existing illegal ramps and piers in Camino del Indio, and all the cases were scheduled for hearings. Four of the structures were removed voluntarily, and no new structures were built since the Rangers were permanently assigned to the reserve.

**Accomplishment: JBNERR and DNER made considerable progress toward halting resource degradation on the reserve's western boundary in the vicinity of Camino del Indio and Las Mareas. JBNERR and DNER marked the reserve's boundary, enhanced awareness of and coordination with relevant agency stakeholders, and improved enforcement. Significantly, several illegal piers were removed from the area and no new structures have been built.**

While a great deal of progress has been made in the areas of Camino del Indio and Las Mareas, challenges remain. For example, while the DNER Legal Division continues to pursue the court case regarding title holdings in Camino del Indio from a variety of angles, it has yet to be resolved. DNER also continues to pursue enforcement cases and the removal of illegal piers within the boundary of the reserve. Additionally, reduced water quality in Mar Negro resulting from historical filling in Camino del Indio persists. During the site visit, reserve staff discussed these issues and approaches for addressing them with the evaluation team.

**10. Necessary Action: JBNERR and DNER must continue to address remaining resource issues in Camino del Indio and Las Mareas. In its semi-annual progress reports, JBNERR will report on progress in addressing: (1) the court case regarding title holdings in Camino del Indio; (2) enforcement cases and the removal of illegal piers within the boundary of the reserve; and (3) reduced water quality in Mar Negro resulting from historical filling in Camino del Indio.**

## **2. Northern Boundary**

Hacienda Aguirre is a former sugar cane estate bordering JBNERR. PRLA leased the agricultural lands to a company that planned to convert them for a corn research project. In 1993, PRLA began preparing land for the project. Preparations included:

- Rebuilding and widening an old dike on reserve property in order to put in a road;
- Clearing and excavating six drainage ditches from the agricultural lands through reserve mangroves to the open waters of Jobos Bay;
- Clearing vegetation and discharging fill and other excavated materials in the area of the ditches within the reserve's boundary; and
- Clearing two acres of forested land on reserve property, part of which was planted subsequently with corn.



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These activities occurred in mangrove forests, saltflats and herbaceous marshes. Upon investigation, it was evident that the wetlands destruction was unauthorized; USACE had not issued any §404 permits allowing PRLA to undertake the activities described. In response, USACE issued PRLA a cease and desist order in 1995 and elevated the case to the U.S. Environmental Protection Agency (EPA) due to PRLA's status as a repeat offender. In 1996, EPA prepared a consent order requiring PRLA to undertake a number of actions, some of which were directed at immediate correction of the violations, while others were intended as compensation. At the time of the 2001 evaluation site visit, the black mangrove forest had completely died off and several key actions outlined in the consent order had yet to be completed. Remaining actions included: (1) a land transfer from the PRLA to the reserve; (2) design and construction of a filter strip; and (3) mangrove restoration.

As required by the 2002 final evaluation findings, JBNERR and DNER initially developed an action plan and timeline for coordinating efforts with PRLA and other agencies as necessary to complete the consent order actions. Following the site visit by OCRM staff in August 2004, DNER and OCRM agreed that JBNERR would convene an interdisciplinary and interagency restoration planning workgroup to prepare a science-based restoration plan for the reserve. Requirements for the northern boundary area restoration science plan included: (1) addressing issues related to the effectiveness of the filter strip and natural versus facilitated mangrove restoration; (2) identifying restoration and enhancement goals, research questions and strategies, and reference sites; (3) integrating data loggers for long-term monitoring; (4) utilizing CTP to design training and outreach strategies; and (5) addressing impacts of agriculture and other development in the watershed on the water table and reserve resources.

As a result, the reserve reinvigorated its RAC and invited it to guide JBNERR's restoration efforts. After several meetings and field trips at the reserve, the committee produced "Changes in the Ecosystem Dynamics of Mangroves and Salt Flats at the Jobos Bay NERR, Puerto Rico." This document is currently serving as the baseline for future projects and alternative management practices within the reserve's salt flats and black mangrove forests. The Committee also completed the restoration plan. All but one of the actions listed in the EPA consent order were completed. The remaining action is mangrove restoration, which is pending a final recommendation from JBNERR's RAC. During the review period, the RAC began exploring which restoration techniques are most appropriate for the northern boundary as well as to what state the mangrove forest should be restored. For example, black mangroves have begun to return to the area, but they are shorter and sparser than the forest that existed previously. However, the RAC has indicated that the pre-existing black mangrove forest may have been artificially high and dense as a result of ample freshwater runoff from inefficient irrigation of sugar cane crops. With changes in crops and irrigation technology, the amount of water now reaching the black mangroves on JBNERR's northern boundary may in fact be more "natural." OCRM encourages the RAC to implement its restoration plan and to complete its assessment of restoration techniques for the reserve's northern boundary.

**Accomplishment: JBNERR and DNER have overseen efforts to address black mangrove degradation on the northern boundary. The RAC completed a comprehensive restoration plan for the reserve, and progress was made on the EPA consent order. Black mangroves are returning to the area.**

### 3. Land Acquisition

JBNERR's 2001 acquisition plan identified five key parcels: (1) the mangrove forest behind the Visitors' Center, (2) Cayos La Barca, (3) a salt flat on the western boundary of the reserve, (4) an upland forest area on the northern boundary between reserve and agricultural land, and (5) a mangrove corridor along Mar Negro. Of the five sectors, the mangrove forest behind the Visitors' Center and Cayos La Barca were ranked as the highest priorities because: (1) development pressure in the area was increasing; and (2) the lot behind the Visitors' Center would provide the only direct access to Jobs Bay for the reserve. PRLA agreed to transfer the upland forest to the reserve as a compensation site per the EPA consent order.

The reserve acquired all five of the identified parcels during the current review period. This is a significant accomplishment for the reserve, as acquisition of some of the parcels, particularly the one transferred from PRLA, had been pending for years. The resulting boundary expansion provides the reserve with greater control over its resources and much-needed direct access to Jobs Bay's waterfront.

**Accomplishment: JBNERR successfully acquired all five parcels of land identified in its 2001 acquisition plan.**

The evaluation team was impressed with the reserve's acquisitions during the review period. However, as noted earlier in this document, the newly-acquired parcels also transferred responsibility to JBNERR for several associated structures. The evaluation team and JBNERR staff discussed establishing a stewardship budget for the reserve, particularly for the newly-acquired lands and associated structures. While the acquisitions represent a great opportunity for the reserve, the opportunity may be lost without careful planning and budgeting. In the context of the management plan revision, the reserve should develop a stewardship plan that incorporates its newly-acquired lands into both the Research and Monitoring Program and the Education and Outreach Program. The plan should be accompanied by a stewardship budget. Effective stewardship requires adequate resources.

**11. Program Suggestion: JBNERR and DNER should develop a reserve stewardship plan and budget that includes the parcels acquired during the review period.**

#### 4. Interagency Stewardship Agreement

As described in preceding sections of this document, the resource degradation issues at JBNERR in 2001 were very complex. Numerous commonwealth and local entities have jurisdictions relevant to the problems. Thus, in order to slow and eventually reverse the degradation, many individuals need to be aware of the problem and of their agency's or organization's role in resolving it. Most importantly, they need to be committed to working toward a solution.

Recognizing these issues, the DNER Secretary initiated an interagency stewardship agreement during the current review period that addressed permitting, monitoring and enforcement at the reserve. The agreement succeeded in: (1) raising awareness of the issues among all relevant partners; and (2) identifying specific actions required to resolve the situation. All parties identified in the agreement signed it<sup>6</sup> and committed to addressing existing enforcement problems at the reserve as well as preventing new problems from occurring. Additionally, the agreement has facilitated open communication among agencies that previously had not collaborated to address resource degradation at the reserve. No new enforcement issues have occurred at JBNERR since the agreement was signed. OCRM commends DNER for initiating and completing the comprehensive interagency stewardship agreement.

**Accomplishment: DNER initiated a comprehensive interagency stewardship agreement regarding permitting, monitoring and enforcement at the reserve. All parties identified in the agreement signed it and committed to addressing existing enforcement problems at the reserve as well as preventing new problems from occurring. No new enforcement issues have occurred at the reserve since the agreement was signed.**

OCRM urges DNER to maintain high-level interest in the agreement and to ensure that it becomes the standard operating procedure for permitting, enforcement and stewardship in the Jobs Bay Watershed. One way to keep relevant partners engaged is to dedicate a coordinator who would oversee implementation of the agreement. DNER might also consider using the interagency agreement as a model for addressing permitting and enforcement issues in specific geographic areas elsewhere in the commonwealth.

**12. Program Suggestion: DNER should dedicate a coordinator to oversee implementation of the interagency stewardship agreement in order to keep partners engaged and to ensure that the agreement becomes the standard operating procedure for permitting, enforcement and stewardship in the Jobs Bay Watershed.**

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<sup>6</sup> Commonwealth signatories included: DNER, PRLA, Regulations and Permits Administration, Department of Housing, Planning Board, Environmental Quality Board and Department of Agriculture. The municipalities of Salinas and Guayama also signed the agreement. While not signatories, the Special Communities Program and the Electric Power Authority participated in the meetings and provided support within the local community.

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**V. CONCLUSION**

For reasons stated herein, I find that Puerto Rico is adhering to the programmatic requirements of the National Estuarine Research Reserve System in the operation of the federally-approved Jobs Bay National Estuarine Research Reserve (JBNERR).

The reserve has made notable progress in staffing, Geographic Information System application, K-12 education programming and the Coastal Training Program. Additionally, JBNERR and the Puerto Rico Department of Natural and Environmental Resources' (DNER) made considerable progress toward halting resource degradation at the reserve during the current review period. JBNERR and DNER collaborated with a wide variety of partners, including many commonwealth agencies, in order to improve stewardship and resource management in the Jobs Bay Watershed. NOAA's Office of Ocean and Coastal Resource Management recognizes JBNERR and DNER for significant progress in the area of stewardship during the review period.

These evaluation findings contain 12 recommendations. These recommendations are in the form of two Necessary Actions and ten Program Suggestions. The commonwealth must address the Necessary Actions by the dates 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 JBNERR that may have implications regarding the commonwealth'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

November 8, 2006  
Date

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<b>VI. APPENDICES</b>
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**Appendix A. Summary of Accomplishments and Recommendations**

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

<b>Issue Area</b>	<b>Accomplishment</b>
Staff	JBNERR made significant progress in staffing by filling several positions with highly-qualified individuals. The staff is committed and enthusiastic and has a strong vision for the future of the reserve.
Geographic Information System	JBNERR maintained strong GIS capabilities and enhanced its excellent GIS database. The application of GIS at the reserve has improved the precision and usefulness of data produced for ongoing projects.
K-12 Education	The Education and Outreach Program expanded its K-12 programming. In particular, education staff engaged students in stewardship and conservation of the reserve and its resources through innovative efforts such as special programming for National Estuaries Day, a reserve photo contest and calendar, and a “Guardians of the Estuary” summer camp.
Coastal Training Program	JBNERR hired its first CTP Coordinator, completed the initial CTP planning phases and began implementation of the program. CTP held successful coastal decision-maker workshops on key coastal issues, fostering increased communication and understanding among its target audiences.
Camino del Indio and Las Mareas	JBNERR and DNER made considerable progress toward halting resource degradation on the reserve’s western boundary in the vicinity of Camino del Indio and Las Mareas. JBNERR and DNER marked the reserve’s boundary, enhanced awareness of and coordination with relevant agency stakeholders, and improved enforcement. Significantly, several illegal piers were removed from the area and no new structures have been built.
Northern Boundary	JBNERR and DNER have overseen efforts to address black mangrove degradation on the northern boundary. The RAC completed a comprehensive restoration plan for the reserve, and progress was made on the EPA consent order. Black mangroves are returning to the area.
Land Acquisition	JBNERR successfully acquired all five parcels of land identified in its 2001 acquisition plan.
Interagency Stewardship Agreement	DNER initiated a comprehensive interagency stewardship agreement regarding permitting, monitoring and enforcement at the reserve. All parties identified in the agreement signed it and committed to addressing existing enforcement problems at the reserve as well as preventing new problems from occurring. No new enforcement issues have occurred at the reserve since the agreement was signed.

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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 two Necessary Actions and ten Program Suggestions. Areas for program improvement include:

<b>Issue Area</b>	<b>Recommendation</b>
Staff	#1. PS: OCRM strongly encourages DNER and JBNERR to: (1) fill current staff vacancies; (2) identify staffing needs that may arise as the reserve's programs mature; (3) explore methods to retain qualified staff; and (4) provide consistent, long-term support for the reserve's core staff.
Management Plan	#2. NA: Within one month of receipt of final evaluation findings, JBNERR must submit a strategy and timeline for revising its management plan to OCRM. Once the strategy and timeline are complete, JBNERR must provide updates on the management plan's revision process in its semi-annual performance reports. The revised plan must be completed by March 2008.
Facilities	#3. PS: As part of its management plan revision, JBNERR should develop a comprehensive facilities plan that assesses its current facilities and its future facilities needs. The reserve's core mission and its capacity should be an integral component of the plan. The plan should describe the pros and cons of refurbishing and maintaining the abandoned structures versus demolishing them; it also should provide detailed cost projections for each option. Additionally, the plan should incorporate sustainable design principles and an energy strategy that examines the potential for generating solar and wind power.
Graduate Research Fellows	#4. PS: The Research and Monitoring Program should work in concert with JBNERR's Research Advisory Committee and Education and Outreach Program to increase awareness about GRF opportunities at JBNERR. Efforts should be made to publicize the program not only in Puerto Rico, but also throughout the wider Caribbean in order to enhance and diversify the program's applicant base.
Research Advisory Committee	#5. PS: The Research and Monitoring Program and the RAC should work together to move the Committee toward a more formal, integrated working group. The RAC should consider broadening its expertise and responsibilities and should begin working collectively in an advisory capacity. In particular, the Committee should develop long-term research priorities that address emerging issues at the reserve.
K-12 Education	#6. PS: OCRM encourages the Education and Outreach Program to develop an education curriculum that: (1) further promotes experiential learning about Jobos Bay's valuable natural and cultural resources; (2) aligns with commonwealth educational content standards; (3) targets local students and teachers; and (4) incorporates the reserve's research and monitoring projects.
Coastal Training Program	#7. PS: OCRM encourages the Education and Outreach Program to: (1) reinvigorate and augment the CTP Advisory Committee with local community representatives; (2) revise the CTP strategic plan; (3) diversify the program's delivery methods beyond workshops; and (4) transition the CTP Coordinator into a full-time position.

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Community Outreach	#8. PS: JBNERR should continue to strengthen its visibility locally and regionally through outreach to area municipalities, Special Communities, relevant commonwealth agencies, researchers, educators and the general public.
Education Advisory Committee	#9. PS: OCRM strongly encourages the Education and Outreach Program to reactivate and revitalize its EAC as soon as practicable.
Camino del Indio and Las Mareas	#10. NA: JBNERR and DNER must continue to address remaining resource issues in Camino del Indio and Las Mareas. In its semi-annual progress reports, JBNERR will report on progress in addressing: (1) the court case regarding title holdings in Camino del Indio; (2) enforcement cases and the removal of illegal piers within the boundary of the reserve; and (3) reduced water quality in Mar Negro resulting from historical filling in Camino del Indio.
Land Acquisition	#11. PS: JBNERR and DNER should develop a reserve stewardship plan and budget that includes the parcels acquired during the review period.
Interagency Stewardship Agreement	#12. PS: DNER should dedicate a coordinator to oversee implementation of the interagency stewardship agreement in order to keep partners engaged and to ensure that the agreement becomes the standard operating procedure for permitting, enforcement and stewardship in the Jobos Bay Watershed.

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Appendix B. JBNERR's Response to 2002 Evaluation Findings

**1. Necessary Action: Within six months of receipt of the final evaluation findings, DNER must fill the position of Education Coordinator with a competent, qualified individual. Progress on filling the Education Coordinator position shall be reported in JBNERR's operations awards semi-annual progress reports.**

DNER has recruited the Education Coordinator for JBNERR. The chosen candidate is an excellent, well-prepared professional.

**2. Program Suggestion: OCRM encourages DNER to establish job descriptions and a recruitment process to address the unique staffing needs of the reserve. OCRM also encourages DNER to include the Reserve Manager in all final hiring decisions regarding reserve staff.**

DNER and JBNERR worked together to establish job descriptions and a recruitment process to address the unique staffing needs for the reserve. Currently, the Reserve Manager is involved in the final hiring decisions regarding reserve staff.

**3. Program Suggestion: OCRM encourages DNER to develop a small purchases capability, such as a Department credit card or petty cash fund, for JBNERR.**

DNER is exploring the possibility of providing a percentage of the reserve's grant in a debit card for projects, small purchases and emergencies.

**4. Program Suggestion: OCRM encourages JBNERR to work with its advisory committees in order to assist their move into a more institutionalized stage of development, including: (1) formalization and empowerment of the committees; (2) integration of committee members' activities; and (3) development of the committees' capacity to advise the reserve as a group and to serve as an advocate for the reserve.**

JBNERR renewed all of its advisory committees (Science, Education and Community) in order to assist their move into a more institutionalized stage of development, including: (1) formalization and empowerment of the committees; (2) integration of committee members' activities; and (3) development of the committees' capacity to advise the reserve as a group and to serve as an advocate for the reserve.



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**5. Necessary Action: Within six months of receipt of the final evaluation findings, DNER must submit to OCRM a Recovery Action Plan and timeline for addressing encroachment and illegal construction on reserve property and attendant resource degradation. The plan must include the elements described in the findings and identify specific actions with target dates. Progress on the implementation of the plan shall be reported in JBNERR's operations awards semi-annual progress reports.**

An internal DNER Committee was established to address JBNERR's 2002 final evaluation findings. Strong support by different units was requested. The department continued to follow up on the Camino del Indio legal case and expects to win. A legal analysis regarding removing the illegal structures and next steps was requested from DNER's Legal Division. The division has requested several actions from the Puerto Rico Environmental Quality Board and the Puerto Rico Regulations and Permits Administration.

DNER sent a letter to the Puerto Rico Department of Housing requesting its collaboration. The department also approached the Special Communities Program in the Governor's office.

DNER's Ranger Corps and Legal Division submitted 19 complaints regarding illegal ramps and piers in Camino del Indio. No new structures have been built since the Rangers began working closer with the Reserve. The Legal Division has brought eight cases to hearings. Four of the cases were resolved when the illegal ramps and piers were removed voluntarily.

**6. Necessary Action: DNER must lead the effort to coordinate and complete the land transfer, design and construction of the filter strip, and mangrove restoration on the northern portion of the reserve in order to achieve a more sustainable ecological system. Within six months of receipt of the final evaluation findings, DNER must submit to OCRM an action plan and timeline for coordinating efforts with PRLA and other agencies as necessary to complete the Consent Order actions. The plan must identify specific actions with target dates that will advance the progress of the land transfer, design and construction of the filter strip, and mangrove restoration until completed. Progress on the implementation of the plan shall be reported in JBNERR's operations awards semi-annual progress reports.**

The Secretary of DNER has been in close communication with the Director of the Puerto Rico Land Authority regarding the completion of Consent Order actions and the acquisition of parcel "D." The Secretary and the Director also participated in a field visit to the reserve. The Secretary of DNER met several times with the Land Authority Board of Directors and presented an overview of the importance of JBNERR and its stewardship challenges. The Director of the Land Authority has been very cooperative.

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The Land Authority Board of Directors approved the mitigation land transfer after surveying and appraisal work were completed.

The parcel that connects the Visitors' Center with Jobos Bay was acquired on December 31, 2004, from the Puerto Rico Land Authority. OCRM acquisition grant NA16OR1301 provided \$400,000 for this transaction. On June 9, 2005, the Land Authority ceded another parcel to the reserve.

The DNER Forestry Bureau designed a filter strip along the northern boundary at Mar Negro. The Land Authority has begun implementation of the filter strip. JBNERR is working closely with the Land Authority to select the best time, material and equipment for the filter strip.

JBNERR's Restoration Committee met twice at the Visitors' Center and conducted a site visit by boat along Jobos Bay to Mar Negro, Camino del Indio and Las Mareas. The trip helped the members understand the current situation and to propose studies and management practices for habitat restoration at the reserve. The Committee developed "Changes in the Ecosystem Dynamics of Mangroves and Salt Flats at the Jobos Bay NERR, Puerto Rico." This document will serve as the baseline for future projects and alternative management practices within the salt flats/black mangrove area.

**7. Program Suggestion: OCRM urges DNER to work with the reserve to evaluate existing development pressures in the Jobos Bay watershed and their effects (primary, secondary, and cumulative) on JBNERR. The results of the evaluation should be carefully considered in all future DNER decisions regarding development activities in the Jobos Bay watershed.**

DNER, with help from the Puerto Rico Coastal Management Program, developed a nonpoint source pollution study to address the effects of existing development pressures in the Jobos Bay watershed.

**8. Necessary Action: DNER must take steps either to reactivate the SPA planning process for the Jobos Bay watershed or to develop an alternative coordinated interagency decision-making process regarding development policy. Within six months of receipt of the final evaluation findings, DNER must notify OCRM in writing of the actions it plans to take to address the problem. Progress on the implementation of these actions shall be reported in JBNERR's operations awards semi-annual progress reports.**

The Jobos Bay Special Planning Area Management Plan (SPA) was reviewed by DNER and submitted to the Puerto Rico Planning Board.

Additional zoning districts were added to JBNERR's SPA, including low impact agriculture, conservation, archaeological and historic resources conservation, and restoration. This strategy will strengthen conservation efforts and sustainable uses in the Jobos Bay watershed.

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An interagency cooperative agreement regarding protection of JBNERR was prepared and signed by the heads of all the commonwealth government agencies involved.

**9. Necessary Action: DNER must develop a formal mechanism to forward permit applications for activities in the Jobos Bay watershed to the reserve for review and to incorporate reserve comments into the decision-making process. Within six months of receipt of the final evaluation findings, DNER must notify OCRM in writing of the mechanism it has established to address this issue. Progress on the implementation of this mechanism shall be reported in JBNERR's operations awards semi-annual progress reports.**

An Administrative Order (2003-17) was signed by the Secretary of DNER on September 18, 2003, to instruct all divisions of the department to refer to JBNERR all projects in the watershed for evaluation and recommendation. This order is also a mechanism to promote protection.

**10. Necessary Action: DNER must take action to provide an increased and regular Ranger Corps presence throughout the reserve as well as to ensure that back-up officers will be available when they are required. DNER also must provide necessary legal support to Ranger Corps enforcement actions in a timely manner to ensure that rangers feel empowered to engage in appropriate enforcement, particularly in cases of illegal fill and construction on reserve property. Within six months of receipt of the final evaluation findings, DNER must notify OCRM in writing of the actions it has taken to improve Ranger Corps staffing and effectiveness at JBNERR. Progress on the implementation of these actions shall be reported in JBNERR's operations awards semi-annual progress reports.**

JBNERR requested that the Director of the Ranger Corps raise the reserve's profile among the Guayama Unit of Rangers and grant priority to the reserve in terms of human resources and enforcement efforts. Regional Rangers have been trained on coastal ecosystems, particularly coral reefs, and new Rangers will complete integral training. Educational material has been produced and shared with them.

Discussions were held with the DNER Auxiliary Administrator and the Director of the Ranger Corps to detail a special group of Rangers within JBNERR. Although there is no infrastructure to support them currently, the reserve envisions developing an area for this purpose in the newly acquired lands near the JBNERR Visitors' Center. Two Rangers were assigned to provide support, surveillance and protection. The Office of the Secretary is ordering the Director of the Ranger Corps to develop a detailed surveillance plan for JBNERR and nearby areas.

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**11. Program Suggestion: OCRM encourages JBNERR to work with the Planning Board and the municipalities of Salinas and Guayama to ensure compatibility of the municipality plans with the reserve's revised management plan.**

An interagency agreement was signed by the head of commonwealth agencies that participate in permitting processes and law enforcement or that influence the Federal Emergency Management Agency regarding the distribution of funds that might be used to rebuild structures within JBNERR's boundaries.

**12. Program Suggestion: OCRM urges JBNERR to continue to pursue boundary expansion through acquisition of the sectors identified in the reserve's FY 01 acquisition plan, especially the Puerto Rico Housing Department's 15-acre salt flat on the western boundary of the reserve, the mangrove area behind the Visitors' Center, and Cayos La Barca.**

The parcel that connects the Visitors' Center with Jobos Bay was acquired on December 31, 2004, from the Puerto Rico Land Authority. OCRM acquisition grant NA16OR1301 provided \$400,000 for this transaction. On June 9, 2005, the Land Authority ceded another parcel to the reserve.

On November 14, 2005, DNER purchased four mangrove islands at Cayos La Barca and incorporated them into JBNERR's management area.

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**Appendix C. People and Institutions Contacted**

**Jobs Bay National Estuarine Research Reserve Representatives**

<b>Name</b>	<b>Title</b>
Ruth Barton Steele	Administrative Assistant
Claudio Burgos	Maintenance Specialist
Angel Dieppa	Research Coordinator
Luis Encarnacion	Acting Manager
Yogani Govender	Graduate Research Fellow
Sandra Lebron	Education Coordinator
Enid Malave	Research and Monitoring Assistant
Nilda Pena	Education Assistant
Lillian Ramirez	CTP Coordinator

**Federal Government Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Ariel Lugo		U.S. Forest Service
Jesus Rodriguez		U.S. Geological Survey
Jose Rodriguez		U.S. Geological Survey

**Commonwealth Government Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Claribel Diaz		DNER Legal Division
Ernesto Diaz	Administrator	DNER Natural Resources Administration
Myra Garcia		DNER Natural Resources Administration
Leo Gonzalez	Accountant	DNER
Javier Rua		DNER
Jose Tous		DNER Legal Division
Javier Velez Arocho	Secretary	DNER
Juan Rojas Leyes		Puerto Rico Land Authority
Rolando Sepulveda Gonzalez		Puerto Rico Land Authority
Jose Villamil Perez		Puerto Rico Land Authority
Thomas Cartagena		Puerto Rico Department of Housing
Alexis Ramos Echeandia		Puerto Rico Department of Housing
Hector Jimenez Negron		Puerto Rico Regulations and Permits Administration, Guayama Region
Jose Santiago		Puerto Rico Regulations and Permits Administration, Guayama Region

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**Local Government Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Gerardo Acevedo		Municipality of Guayama
Orlando Collazo		Municipality of Guayama

**Academic Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Ruperto Chaparro	Director	Puerto Rico Sea Grant
Imar Mansilla Rivera		University of Puerto Rico School of Public Health
Carlos Rodriguez Sierra		University of Puerto Rico School of Public Health
Elvira Cuevas		University of Puerto Rico at Rio Piedras
Miriam Gallardo Gonzalez		Simon Madera Intermediate School
Nayda Medina Flores		Coqui Intermediate School
Jose Sanchez Santiago		Woodrow Wilson School
Eris Torres Rivera		

**Community Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Waleshla Flores Morales		
Teofilo Lazzu		
Nilda Luhring Gonzalez		Office of Special Communities
Rosa Mangual		
Ana Martinez		
Myrna Padilla Cardelano		
Carlos Picot		
Felipo Varga		
Jillian Vazquez		

**Other Representatives**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Edwin Alfonso		Ocean Physics Education, Inc.
Alida Ortiz		Environmental Education Consultant

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**Appendix D. Public Meeting Attendees**

Marcos Aleriva  
Miguel Ballester  
Oswabela Bermudez  
Joseph Borges Reyes  
Claribel Caraballo Cruz  
Hery Colon Zayas  
Ninotchka Colon  
Valery Colon  
Thalia Fernandez  
Maritza Maldonado  
Francelys Ortiz  
Santos Ortiz  
Wanda Ortiz  
Tatiana Perez  
Sheneyna Quinones  
Jorge Lebron Ramos  
Cristian Reyes  
Waldemar Rivera  
Shannen Rosa  
Jose Salguero Faria  
Janeska Sanchez  
Axel Torres  
Wilfredo Valentin Rivera  
Wiljanelly Valentin  
Maria Zayas

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**Appendix E. OCRM's Response to Written Comments**

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