

# PUERTO RICO'S

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# CORAL REEF MANAGEMENT PRIORITIES



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The Commonwealth of Puerto Rico and NOAA Coral Reef Conservation Program. 2010. *Puerto Rico's Coral Reef Management Priorities*. Silver Spring, MD: NOAA.

*The NOAA Coral Reef Conservation Program would like to thank all those involved in the process to identify and publish the coral reef management priorities for Puerto Rico. The commitment, time and effort invested in this process is greatly appreciated. These priorities will play an important role in defining NOAA's partnership with the jurisdiction to work towards coral reef conservation. Special thanks to Zhe Liu for graphic design and Lauren Chhay for photo support.*

*Cover Photo Credit: Dwayne Meadows, NOAA NMFS OPR*

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# INTRODUCTION

The purpose of this Priority Setting document is to articulate a set of strategic coral reef management priorities developed in consensus by coral reef managers in Puerto Rico. NOAA will use this document in conjunction with its 2010–2015 Coral Reef Conservation Program National Goals and Objectives (available at [www.coralreef.noaa.gov](http://www.coralreef.noaa.gov)) to direct its investment in activities in each jurisdiction through grants, cooperative agreements and internal funding. NOAA will also make the document available to other potential funders (NGOs, federal partners, etc.) and encourage leveraging and new or expanded partnerships to build common coral reef conservation goals.

The work presented here is being facilitated by the NOAA Coral Reef Conservation Program (NOAA CRCP) as part of an ongoing effort to develop place-based, local coral reef management priorities in each of the seven U.S. state and territorial coral reef jurisdictions (American Samoa, Commonwealth of the Northern Mariana Islands, Florida, Hawai'i, Guam, Puerto Rico and the U.S. Virgin Islands) and conduct capacity assessments to identify the support needed to accomplish those priorities. The first step in this effort has been to work with the core group of coral reef managers in each jurisdiction to articulate a set of strategic coral reef management priorities among existing management needs. The second, and next, step will be to complete a capacity needs assessment that helps each state and territory realize these priorities.

This priority setting process stems from an external review of NOAA CRCP conducted in 2007 to independently assess how effectively the program has met its goals. The review included recommendations for future improvements. In response to the review, NOAA CRCP developed a "Roadmap for the Future," laying out new principles and priorities. A key part of this new Roadmap includes developing management priorities for each and all of the coral reef jurisdictions and conducting capacity assessments to achieve these priorities. NOAA CRCP is providing support to the jurisdictions to coordinate with the broader management community in each place to determine these strategic goals and objectives for each state and territory. Priority setting and capacity assessment initiatives began in 2009 and will be implemented in two to three jurisdictions per year.

This Priority Setting document is divided into the following sections:

1

**Scope, Development and Prioritization Process:** This section details the process by which the Priority Goals and Objectives were reached, including the preparation for the workshop, work done at the workshop and post-workshop refining.

2

**Strategic Coral Reef Management Priorities:** This section presents the entire framework of goals and objectives developed and agreed upon by the core managers' group. In this section, the Priority Goals and Objectives are highlighted. These are the top priorities for management action as identified in the workshop.

3

**Linkages to NOAA's National Goals and Objectives:** This section lists priority sites for applying the Priority Goals and Objectives (as appropriate). It also describes the process by which the sites were determined at the workshop.

4

**Strategic Priorities Not Captured in the Priority Framework:** This section describes how the local jurisdiction management priorities align with NOAA CRCP's national priorities and future direction.

# SECTION ONE: SCOPE, DEVELOPMENT AND PRIORITIZATION PROCESS

This document captures the final set of priorities agreed upon by the core managers group at the priority setting workshop. The core managers group is defined as the coral reef managers who have the direct responsibility for managing the coral reef ecosystem in Puerto Rico. In addition to those coral reef managers, NOAA's jurisdictional Points of Contact (POCs) are welcome to add additional individuals to ensure appropriate local representation. The managers, as well as those who were asked to participate in the initial analysis and review of this document, are listed in Appendix One.

In preparation for the workshop, previously identified goals and objectives were taken from current management documents and presented in the Situation Analysis. The Situation Analysis is a preparatory document that summarizes: coral reef threats, condition and trends; key management issues; and key agencies' management goals. Its primary purpose is to compile and consolidate available management documents from various management bodies and geographic localities ahead of interviews and meetings. Appendix Two presents a summary of the Situation Analysis' findings.

This Situation Analysis was augmented by a series of interviews that captured managers' working perceptions of management goals as they are stated in management documents. In addition to commenting on current management documents, interviewees were given the opportunity to provide their professional perspectives on threats to coral reef resources and management actions needed to abate those threats, published or otherwise. Taken together, this information formed the basis for the workshop discussions by offering an initial set of goal areas to consider.

During the interviews with the core coral reef managers and management advisors in Puerto Rico, facilitators identified challenges to and current deficiencies in achieving stated goals and objectives, noting specific capacity gaps that likely will need attention. This information will serve as the starting point for the capacity assessment, to be completed in the following year. It is summarized in Appendix Three.

Workshop participants worked from the Situation Analysis, current Local Action Strategy (LAS) goals and interview results to



Participants in the priority-setting workshop collaboratively selected priority conservation goals and sites to focus coral conservation efforts in Puerto Rico. Photo Credit: Dana Wusinich-Mendez, NOAA CRCP

develop specific and time-bound goals and objectives to address each of these need areas. Participants were asked to develop goals and objectives for the coral reefs for all of Puerto Rico, rather than for the mandated area of each workshop participant.

For the purpose of this exercise, the following definitions were used:

Goals are defined as the highest-level result the jurisdiction seeks to achieve (e.g., stable, sustainable coral reef ecosystems) in the next five to seven years.

Objectives are defined as the environmental, social and institutional outcomes the jurisdiction must achieve to reach the end goal. Objectives are generally actionable within a three- to five-year time frame.

This document presents (1) the comprehensive set of goals and objectives based on existing local action strategies

and other management plans, revised by the core group, and (2) a subset of priority goals and objectives within that larger list.

The core group identified the priority goals with a five to seven-year time frame and objectives as those that require immediate attention over the short term (three to five years). These priority goals and objectives will help guide NOAA CRCP funding allocations for management activities.

The CRCP understands and respects the flexibility required by coral reef managers in implementing complex conservation and management programs. Should our partners seek funding for projects related to off-priority issues (either in the comprehensive framework herein or a new emerging issue not reflected in this document) the CRCP will need to understand why the requested funding is most appropriate for the off-priority work versus the efforts to address the priority threats identified through this process.



Puerto Rico's reefs are home to a variety of coral and fish species. Photo Credit: NOAA CCMA Biogeography Branch

The Priority Goals and Objectives are identified by **orange/bold** and *orange/italic* font, respectively. The attendees voted on the priority objectives once the priority goals were identified and only for those priority goals. Objectives under the other goals not identified as priorities were not voted upon. Coral reef managers and their partners are encouraged to seek other sources of funding and support outside of the NOAA CRCP to implement both priority and off-priority goals and objectives.

The top eight priority goals—as identified by the workshop participants—to address the priority needs outlined above and agreed upon by the core group are:

- Implement land-use planning at the watershed scale to minimize water quality impacts to the coral reef ecosystem.
- Control and reduce pollutant transport to the marine environment.
- Strengthen enforcement and engage stakeholders through education to reduce pollutant transport to the coral reef ecosystem.
- Protect coral reef ecosystem from large- and small-scale fisheries impacts through an informed planning process.
- Enhance enforcement and management programs to reduce fishing impacts to coral reef ecosystems.
- Utilize enforcement and education to encourage public compliance with fishing regulations and reduce impacts of fishing.
- Manage the recreational and maritime uses of marine and coastal areas to reduce the impacts on coral reefs.
- Enable and promote sustainable development practices in the coastal zone and upland areas of Puerto Rico that are associated with priority coral reef areas.



# SECTION TWO: STRATEGIC CORAL REEF MANAGEMENT PRIORITIES

This section presents the entire framework of goals and objectives developed and agreed upon by the core group. In this section, the Priority Goals and Objectives are identified by **orange/bold** and *orange/italic* font, respectively. These are the top priorities for management action as agreed upon by the core managers group. These priority goals and objectives will guide funding allocations for management activities. Goals are listed below Issue Areas, identified by the core group, that are meant to provide the overall target for the particular goal and objective set.

## **ISSUE AREA A. IMPROVE WATER QUALITY AND RELATED REEF SYSTEMS BY REDUCING POLLUTANT INPUTS FROM TERRESTRIAL SOURCES.**

**GOAL A1. Implement land-use planning at the watershed scale to minimize water quality impacts to the coral reef ecosystem.<sup>1</sup>**

Objectives:

- A1.1 Support the use of a watershed approach in the development and implementation of new and existing Municipal Ordinance Plans and Puerto Rico Land Use Plan. These plans will consider the cumulative impacts of existing and expected land use and require best management practices that avoid and minimize impacts to water quality be developed and applied (this could include restricting land clearing activities to the dry season). This applies to urban, residential, recreational (including off-road vehicles) and agricultural uses. (See Natural Resources Conservation Service, Department of Natural and Environmental Resources, Puerto Rico Planning Board, Environmental Quality Board, Federal Highway Administration, Agricultural Extension Service and other best management practices documents.)*

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<sup>1</sup> On December 1, 2009, Law 161 was approved. This law establishes the legal and administrative procedures for permit processing. In December 2010, the new permitting agency in Puerto Rico, Oficina de Gerencia de Permisos (OGPe) was established. This agency did not exist at the time that these goals and objectives were developed. Coral reef managers in Puerto Rico should consider the need for coordination with this agency when working to develop any implementation plans for these priorities.

*A1.2: Develop stricter regulations and enhance enforcement capabilities for agricultural and development activities to ensure that best management practices that reduce sediment, nutrient, fecal coliform and pesticide transport be implemented and erosion, including channel protection, be mitigated.*

*A1.3: Use existing incentive programs and strengthen partnerships with United States Department of Agriculture (USDA) and local Department of Agriculture, Environmental Protection Agency (EPA), Public Health and Environmental Quality Board (EQB) to provide incentives and ensure compliance with regulations at the same time.*

- a. Make sure the landowners have a management plan developed by Department of Natural and Environmental Resources (DNER) technicians under the Forest Stewardship Program. Make sure that incentive program is available to those who rent farmland. Ensure that owners are obligated to implement erosion control and buffer zone requirements on their land that they rent.

*A1.4: Ensure that planning activities are at a watershed scale and loss of coastal habitats (wetlands, seagrass) that serve as filters to maintain water quality is avoided and minimized.*

A1.5: Ensure compliance with the requirement to include cumulative impacts in environmental documents so as to improve agency evaluation of all project impacts. Require that environmental assessments for developments be submitted to DNER for DNER to provide comments to

EQB regarding potential impacts to the coral reef ecosystem. Currently, including cumulative impacts is a legal requirement in the permit process, requiring that EQB certify compliance with the environmental document requirements of Public Law 4. However, cumulative impact analysis is often not included in the environmental assessment and therefore lost from the project evaluation.

A1.6: New and existing sediment reduction and stormwater management plans should take a holistic watershed approach, considering the interaction between upland actions and their impacts on the marine environment, including seagrass and mangroves.

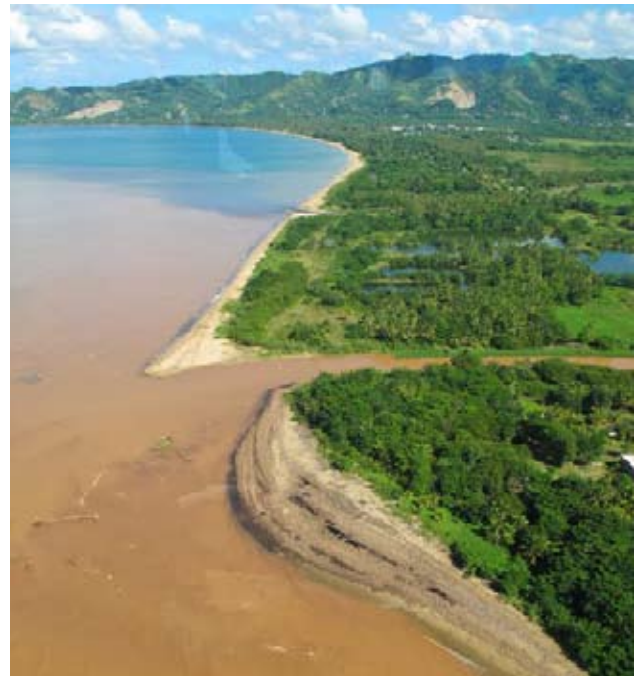
## **GOAL A2. Control and reduce pollutant transport to the marine environment.**

Objectives:

*A2.1: Eliminate combined sewers where stormwater and wastewater systems are joined to reduce overflows and associated water quality impacts to water bodies (i.e., San Juan, Boqueron, Calle Calaf).*

*A2.2: Upgrade wastewater treatment plants to eliminate discharges to the sea unless plants become tertiary or other treatment options, such as treatment wetlands and other improvements to discharge quality, are completed.*

*A2.3: Support the development of measurable standards that create allowable levels of nutrient and fecal*



*Land-use planning and reduction of pollutant transport to the marine environment are two aspects of Puerto Rico's focus area to improve water quality and related reef systems. Photo Credits: NOAA Restoration Center*

*loading to inland and coastal water bodies. This should build from the current EQB initiative to write standards for contaminant loading to inland water bodies by extending the standard to coastal areas. Improve aquatic life criteria based on data for Puerto Rico, where possible, to make marine and coastal water quality standards appropriate for marine organisms.*

*A2.4: Establish water quality monitoring stations in coral reef ecosystem areas and add water quality monitoring components to established coral monitoring sites around Puerto Rico. Establish standards in terms of what to monitor for and how to ensure comparability of data across locations. Use data regarding areas where water quality is an issue to enhance agency decision-making related to issuance of permits.*

*A2.5: Implement sediment reduction practices and stormwater management plans that take a holistic watershed approach, considering the interaction*

*between upland actions and their impacts on the marine environment, including seagrass and mangroves.*

A2.6: Support, whenever possible, upgrading existing wastewater treatment facilities to increase capacity and level of treatment, provided that the changes will be adequate to address sewage load and improve water quality (i.e., Parguera).

A2.7: Control thermal discharges (i.e., Aguirre, Costa Sur)—use EcoElectrica as example of good practice.

A2.8: Develop and implement new regulations and practices for onsite sewage disposal systems (OSDS) standards that ensure these systems are built, installed and maintained according to known best practices. Single-family units are currently not regulated under OSDS and should be included. Leverage the collaborative Watershed Stewardship Program, which provides resources and expertise to upgrade household

septic systems so they adhere to known best practices, to expand it throughout the island if the pilot project is successful.

- A2.9: Support the implementation of the recently approved phosphate detergent ban, which became effective January 1, 2010, and the implementation of the existing nonpoint source executive order.
- A2.10: Create and deploy best practices that reduce pollutant loading from Confined Animal Feeding Operations (CAFO) and other livestock operations. Management practices should reduce nutrient levels in the feed provided to livestock. Work with Natural Resources Conservation Service (NRCS), Environmental Protection Agency (EPA) and EQB to ensure that regulations are appropriate to an island where CAFOs may not be large, but can have major impacts to water bodies for nonpoint source permits for stormwater runoff. Ensure that regulations between EPA and EQB are consistent in prohibiting direct discharges from CAFOs to water bodies. Ensure implementation of best management practices for all livestock operations to minimize nonpoint discharges from the operation related to the management of animals and land-use management.
- A2.11: Restore, acquire and enhance coastal wetlands, forests and riparian zones as possible to maintain these filters to water quality.

**GOAL A3. Strengthen enforcement and engage stakeholders through education to reduce pollutant transport to the coral reef ecosystem.**

Objectives:

*A3.1: Reduce erosion from any earth movement activities (e.g., development, home expansion, agriculture) through a mix of education and enforcement.*

- a. Education strives to ensure that landowners are aware of best practices and the possible enforcement actions for not following them as well as making landowners aware of the benefits of implementing best management practices (such as protecting the water body that provides drinking water, recreation, or other benefits to the community).
- b. Improve the enforcement process from initial intervention with violator through legal action. Create agreements between rangers and other agencies to assist with enforcement and education.

*A3.2: Improve the efficiency of the implementation of the regulations related to the control of erosion and sedimentation and stormwater runoff at the commonwealth and federal levels.*

*A3.3: Ensure that mitigation plans are properly implemented and that the project has not resulted in the loss of habitat and take necessary enforcement action for noncompliance with mitigation plans. Coordinate between EPA, Corps of Engineers (COE), EQB, etc., to ensure enforcement is geared toward protecting habitat and less toward issuing fines.*

*A3.4: Create certification program for developers, contractors, agricultural operators and consultants certifying that they have been trained in best management practices for different land uses appropriate to their activities.*

*A3.5: Recruit enforcement personnel with a commitment to conservation and sustainable development of coastal and marine resources. Provide all law enforcement officials (rangers, lawyers and judges) with educational opportunities to increase their effectiveness and efficiency at implementing conservation and resource management regulations.*

A3.6: Provide education and outreach to the judicial system, including legal departments, lawyers and judges, so they can effectively prosecute noncompliance cases.

A3.7: Develop additional requirements that look at the potential impacts—instead of the size or amount of earth movement and storage—to ensure that the transport of sediments to water bodies is minimized.

A3.8: Ensure compliance with management plans for agricultural operations.

A3.9: Ensure that citizens (e.g., developers, agricultural operators, homeowners) receive orientation through educational campaigns regarding regulations related to protection of water quality (e.g., earth movement, sewage, disposal of materials such as oil) and make them aware of consequences of noncompliance.

A3.10: Create certification program for agency personnel who implement regulations that could impact erosion, sediment transport and water quality for any land use to ensure agency personnel are familiar with regulations, best management practices and requirements related to habitat conservation and other natural resource issues.

A3.11: Encourage programs that provide incentives to the regulated

community for compliance with regulations. Incentives may include reduced monitoring requirements for a good compliance record, reduced permit fees, etc.

A3.12: Workshops with EQB, Department of Agriculture (DA), NRCS and other relevant agencies to orient personnel regarding CAFOs, new regulations and appropriate best management practices based on physical characteristics of the agricultural areas.

## **ISSUE AREA B. APPLY IMMEDIATE PROTECTION TO COMMERCIAL, RECREATIONAL AND ARTISANAL CORAL REEF FISHERIES AND RELATED CORAL ECOSYSTEMS BY EMPLOYING AVAILABLE AND KNOWN MANAGEMENT TOOLS TO PROTECT AND CONSERVE.**

### **GOAL B1. Protect coral reef ecosystems from large- and small-scale fisheries impacts through an informed planning process.**

Objectives:

*B1.1: Identify, designate and implement a minimum of 3% of the insular platform as no-take marine reserves in compliance with Resolution Number 307 and prepare management plans in collaboration with communities as practicable for these reserves. The areas to be designated should be concerned with the protection of coral reefs ecosystems.*

B1.2: Develop criteria to establish new protected areas.

B1.3: Search for and identify management tools that could be applied to fisheries and related ecosystem



*Left Image: Protecting coral reef fisheries, such as for red hind, is a priority focus area for coral reef ecosystem conservation in Puerto Rico. Photo Credit: Dr. Jorge García and Jorge Sabater Right Image: Providing education to enforcement personnel, such as this training to help them identify and distinguish between regulated and unregulated species, is a tool to improve enforcement of fishing regulations. Photo Credit: Lisamarie Carrubba, NOAA NMFS SERO*

protection and management in Puerto Rico.

B1.4: Reduce overfishing on critical stocks that most directly affect the health and resilience of the reef system by immediately implementing a closed season and catch limits of known spawning and aggregating species.

**GOAL B2. Enhance enforcement and management programs to reduce fishing impacts to coral reef ecosystems.**

Objectives:

*B2.1: Enhance the fisheries data collection programs.*

B2.2: Support new and existing regulations that eliminate or reduce impacts on fisheries and coral reef habitat from gear and overfishing.

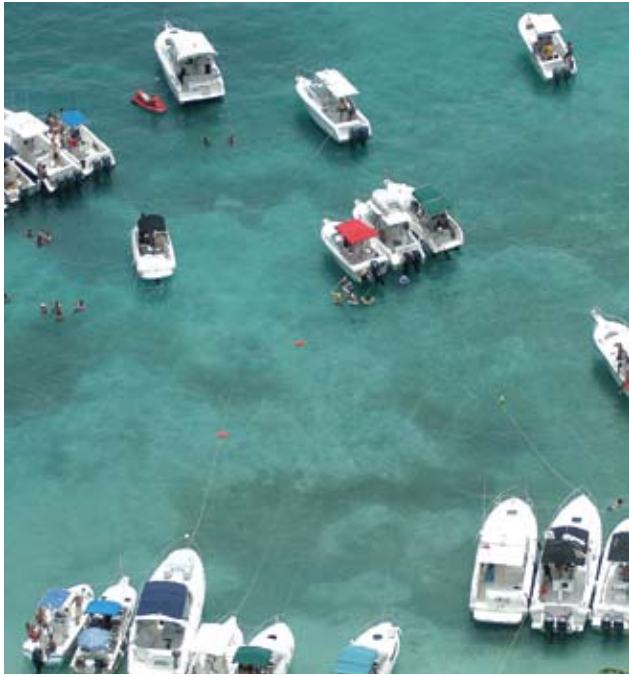
B2.3: Support and review the existing fishing and coral reef laws and

regulations for taking of reef fish to ensure that they are applicable to current issues and can be efficiently administered.

a. Support the review of the administrative process of the enforcement of these regulations, e.g., instead of the administrative process, issuing tickets (citations).

B2.4: Support the development of guidelines and regulations and determine the impact of aquaculture projects to ensure that they contain adequate requirements for both their placement and operations. Use existing information and programs for aquaculture development and customize them for application in Puerto Rico.

**GOAL B3. Utilize enforcement and education to encourage public compliance with fishing regulations and reduce impacts of fishing.**



Left Image: Managing recreational and maritime uses of coastal areas to reduce vessel anchoring and boat groundings, is one goal in Puerto Rico's focus area to reduce human impacts to its reefs. Photo Credit: Hector Horta Right Image: This threatened *Acropora palmata* in Rincón is suffering from coral disease. Photo Credit: Dr. Jorge García and Jorge Sabater

**Objectives:**

*B3.1: Create an outreach and educational campaign to reduce fishing impacts over coral reef ecosystems aimed at the following:*

- a. Recreational fishing community.*
- b. Commercial fishing community.*
- c. The judicial system.*

*B3.2: Provide education to enforcement personnel strengthening their understanding of impacts from recreational and maritime uses on coral reef ecosystems.*

**B3.3:** Export positive experiences from communities that have successfully implemented no-take zones to other communities that would benefit from such an approach.

**B3.4:** Empower enforcement agencies so they are able to implement existing regulations in areas that require immediate protection.

**B3.5:** Enable joint enforcement agreement between local, national and federal agencies to improve efficiency of operations.

**ISSUE AREA C. REDUCE THOSE HUMAN IMPACTS THAT ARE MOST CRITICAL TO CORALS' PROTECTION AND HEALTH.**

**GOAL C1. Manage the recreational and maritime uses of marine and coastal areas to reduce the impacts on coral reefs.**

**Objectives:**

*C1.1: Reduce the impact of vessel anchoring and boat grounding on seagrass beds and coral reefs and enable efficient enforcement by:*

- a. Establishing vessel use zones.*
- b. Installing navigation and mooring buoys that demarcate different use zones.*

- c. *Rerouting large vessel traffic to avoid sensitive coral areas, if navigation aids are not effective and/or if there are repetitive groundings.*
- d. *Establishing no-anchor zones.*

*C1.2: Identify specific areas for recreational use. Should focus on already impacted reefs and artificial reef sites so as to preserve and limit activities on higher quality reef ecosystems.*

*C1.3: Develop outreach programs for recreational operators to encourage compliance with coral reef regulations and to use best management practices for recreational use in their operations.*

*C1.4: Develop outreach programs for commercial and maritime operators to encourage compliance with coral reef regulations.*

*C1.5: Prepare and implement a coordinated approach that describes how to respond to physical impacts (vessel groundings, anchor damage, storm damage, etc.) so all the pertinent laws and regulations can be properly enforced.*

**C1.6: Enact regulations to implement Law 147 as it pertains to the impacts of human uses on the coral reef ecosystem as well as how it pertains to achieving the other goals contained herein.**

**GOAL C2. Enable and promote sustainable development practices in the coastal zone and upland areas of Puerto Rico that are associated with priority coral reef areas.**

**Objectives:**

*C2.1: Develop a land-use plan for Puerto Rico that includes the Puerto Rico Coastal Zone as defined by the PR*

*Coastal Zone Management Program (PRCZMP) (including territorial waters) and identifies zones for different uses including conservation, recreation and different types of development. The plan should address issues of light pollution, listed species and habitat protection.*

*C2.2: Identify and prioritize coastal and upland areas associated with priority coral reef areas for land acquisition, preservation, protection and restoration, such as important watershed areas or buffer areas adjacent to protected areas.*

*C2.3: Support the effective management of existing protected areas (such as natural reserves, state forests, and national park and wildlife refuges) within or adjacent to priority coastal areas, including the development and implementation of management plans.*

*C2.4: Increase the capacity of development permitting agencies (DNER, EQB, JP, ARPE, USACOE, USEPA) to monitor development activity and ensure permit compliance.*

**C2.5: Work with private landowners to participate in the forest stewardship program and develop management plans for land use and conservation.**

**C2.6: Identify degraded coastal natural areas with restoration potential, particularly mangrove habitat, coastal wetlands and estuaries.**

**C2.7: Work with relevant agencies to establish written guidelines for the granting of variances and/or waivers to regulations for projects that are located in the coastal zone or will potentially impact watershed stability.**



**GOAL C3. Reduce the impact of invasive species with regulation, enforcement and education.**

Objectives:

- C3.1: Prepare for and protect against invasive species. Work should include monitoring effects of lionfish infestation, work with researchers and managers from the USVI to share lessons and experience, prepare standard operating procedures for handling invasive sightings and prepare standard operating procedures for handling infestations in protected areas.
- C3.2: Teach people about invasive and exotic species, how they affect coastal and marine ecosystems and how they can help with the problem.
- C3.3: Develop and enforce stricter policies to regulate the importation of exotic aquatic species that can affect coral reef ecosystems.

**ISSUE AREA D. MANAGE FOR CLIMATE CHANGE AND DISEASES EMANATING FROM INCREASE IN STORM FREQUENCY AND IMPACT, WATER TEMPERATURE AND AIR POLLUTION AND PROMOTE RECOVERY OF REEFS FROM PREVIOUS EVENTS.**

**GOAL D1. Manage for climate change and diseases emanating from increase in storm frequency and impact, water temperature and air pollution and promote recovery of reefs from previous events.**

Objectives:

- D1.1: Identify areas of high diversity and live coral coverage for additional protection and expand existing protected areas to include these areas. Close areas when bleaching and disease or hurricane damages are extensive to allow for the recovery of reef areas.
- D1.2: Support more research on coral diseases and on the relationship of bleaching to disease; support more research on coral resistance to bleaching/disease and resilience following global, regional and local stressors and on possible effects of climate change on coral reefs and other ecosystems.
- D1.3: Reduce local stressors (e.g., anchors, fishing, etc.) to improve the health of reefs by implementing the priorities set forth herein. Include in vessel grounding response plan a standard procedure for responding to hurricane events and the reef damage they produce.
- D1.4: Strengthen response capability when natural disasters occur.
- D1.5: Encourage green building and other carbon reduction activities to minimize impacts of urban and urbanizing areas.
- D1.6: Apply Coastal Barrier Act to engage FEMA in restoration and clean-up activities in the reef system following natural disasters.
- D1.7: Implement coastal planning that addresses sea level rise and directs new development away from the coastline.

# SECTION THREE: PRIORITY SITES

To effectively manage the implementation of the stated goals and objectives, workshop participants identified high priority geographic areas to apply these goals and objectives. These areas represent a ridge-to-reef approach to coral reef management and include both coral reef habitat and associated watershed areas.

To select priority sites where the above goals and objectives—as well as other site-specific needs—could be implemented, the participants agreed to the following selection criteria:

- **Biological Value:** critical function (habitat value), diversity, abundance of habitat, endangered species.
- **Degree of Risk and Threat:** land-based sources of pollution, water quality, fishing pressures, human activities and climate change (disease and bleaching). To capture both high and low areas of threat, the group created two scales as noted below. This allowed for scores indicating high areas of threat, places that were absent (or near) absent of threats, or some mix of the two.
- **Viability:** existing management capacity and management plans, capacity (staff and infrastructure), existing monitoring, community support/activity and support (NGO and academic).

Once participants agreed upon the criteria, participants used a voting system, which weighted the criteria. This allowed the participants to define the criteria they felt

were most important when selecting priority geographic areas. Priority sites are targeted for initial attention by the CRCP. Presence of existing management plans was considered as part of voting criteria. The group agreed to the following weights, listed in order of priority:

- **Biological Value:** *voting scale of one to five*
- **High Degree of Risk and Threat:** *voting scale of one to four*
- **Absence of Risk and Threat:** *voting scale of one to four*
- **Viability:** *voting scale of one to three*

Participants then identified potential priority sites in Puerto Rico for coral reef conservation (Figure 1 on page 20). This was done using data from the interviews that occurred in previous days as well as a cumulative brainstorm exercise wherein each participant identified additional sites that met the criteria and identified the boundaries for these proposed sites. Overall, 17 sites were identified by the core managers for consideration as priority sites. The group then reviewed each site with individuals commenting on the biological value, degree of risk and threat and management effectiveness of each place. Participants were provided with a worksheet to keep notes and to tally their individual votes. Each participant was then asked to vote for each site using the weighted criteria noted above.

The sites were then ranked highest to lowest. The ranking score was calculated by taking the raw score for each site and dividing it by the number of participants who voted



*Culebra and Guánica are two of the top priority sites identified during the priority-setting workshop. Photo Credits: Left Image: Raimundo Espinoza Right Image: NOAA Restoration Center*

for the place. This was done because not all the participants voted for each place. Table 1 below includes a full list of sites and their scores in rank order. The top four are noted in bold. These are the sites the group agreed should receive initial attention. All of the sites on this list were identified as important sites for coral reef conservation in Puerto Rico

even though only four sites were selected as priorities for initial management action. All of the identified sites are important areas for coral reefs, and even though the CRCP only has resources to prioritize a select few, this does not negate the need to secure additional resources and means to support the additional areas.

**Table 1. Priority Coastal Management Sites**

Area	Total Points	Score (points/votes)
<b>Culebra</b>	<b>99</b>	<b>12.375</b>
<b>North East Reserves</b>	<b>123</b>	<b>12.300</b>
<b>Cabo Rojo</b>	<b>120</b>	<b>12.000</b>
<b>Guánica and Marine Extension</b>	<b>117</b>	<b>11.700</b>
Vieques	105	11.667
Parguera - Pitahaya	105	11.667
Desecheo/Rincón	104	11.556
Caja de Muerto/Derrunbadero	113	11.300
Mona	112	11.200
Mayagüez	105	10.500
Jobos	94	10.444
Cibuco/Vega Baja/Manatí	103	10.300
Maunabo	82	9.111
Guayama Reefs	86	8.600
Isabela	67	8.375
Isla Verde	71	7.100

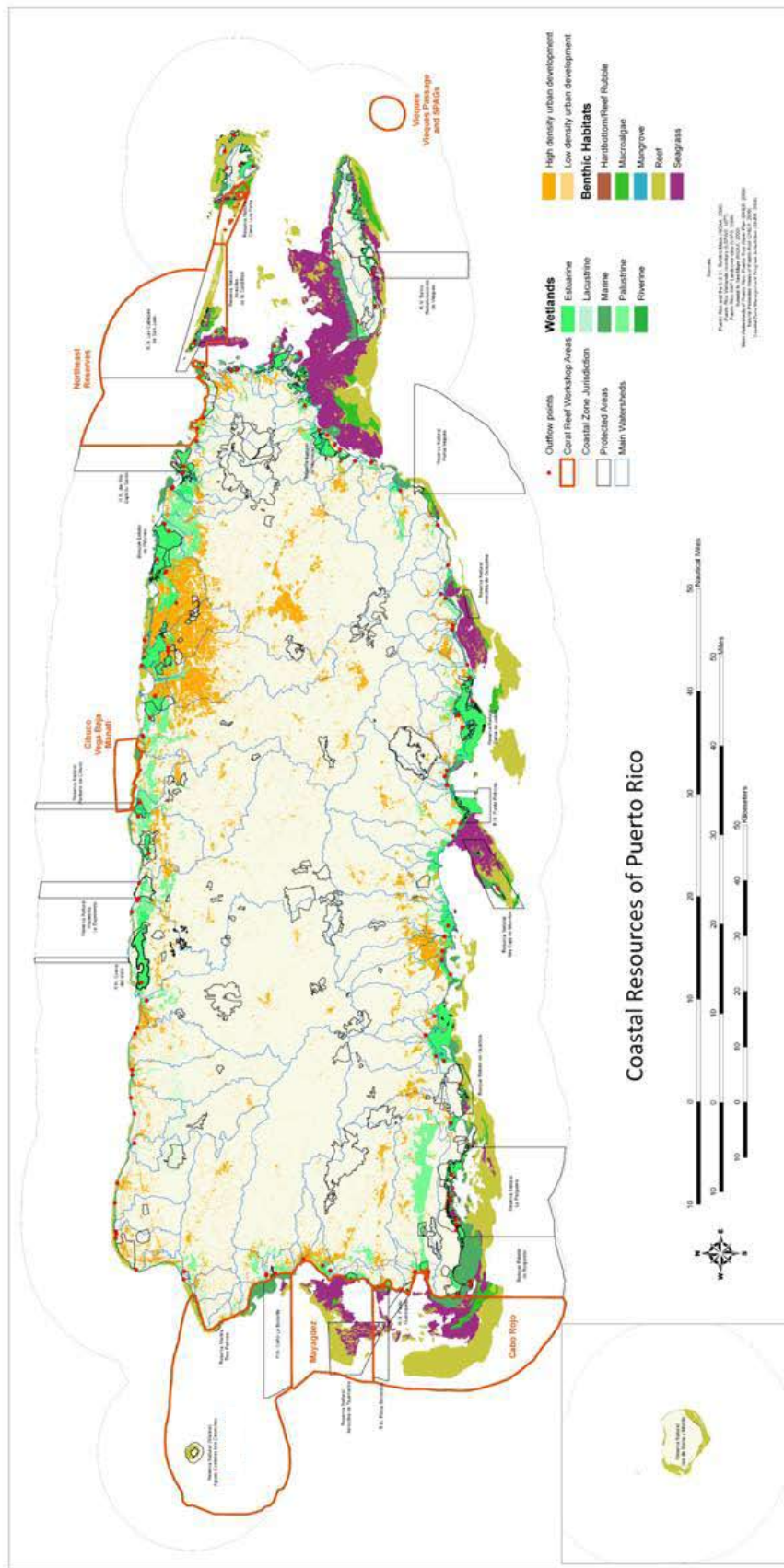


Fig. 1: Map of Puerto Rico identifying existing protected areas and coral reef areas discussed in priority setting workshop (C. Ortiz, Puerto Rico Department of Natural and Environmental Resources, Coastal Zone Management Program, 2010)

# SECTION FOUR: LINKAGES TO NOAA'S NATIONAL GOALS AND OBJECTIVES

Table 2 shows how Puerto Rico's Priority Goals and Objectives correlate to NOAA CRCP's National Goals and Objectives for coral reef conservation. Table 2 was developed after the Puerto Rico Coral Reef Management Priority Setting Process was complete to explicitly identify potential partnerships between the managers in Puerto Rico and NOAA CRCP. Addressing both local jurisdictional priorities and national goals and objectives will increase efficiency and leveraging of the resources available for coral reef conservation. NOAA CRCP will use this table to inform future investments in coral reef conservation in Puerto Rico.

**Table 2. Correlations between Puerto Rico’s Priority Goals and Objectives and NOAA CRCP’s National Goals and Objectives**

Puerto Rico’s Priority Goals and Objectives	NOAA’s National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL A1. IMPLEMENT LAND-USE PLANNING AT THE WATERSHED SCALE TO MINIMIZE WATER QUALITY IMPACTS TO THE CORAL REEF ECOSYSTEM. <sup>2</sup></b>		
Objective A1.1: Support the use of a watershed approach in the development and implementation of new and existing Municipal Ordinance Plans and Puerto Rico Land Use Plan.	LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.	No explanation needed.
Objective A1.2: Develop stricter regulations and enhance enforcement capabilities for agricultural and development activities to ensure that best management practices that reduce sediment, nutrient, fecal coliform and pesticide transport be implemented and that erosion, including channel protection, be mitigated.	LBSP Objective 3.1: Ensure that coral reef jurisdictions have adequate resources and capacity to develop and implement management plans, assess water quality and coral reef ecosystem condition, enforce regulations and evaluate performance.  LBSP Objective 3.4: Ensure that the necessary and consistent regulatory and programmatic framework exists and is enforced to implement watershed management strategies necessary to protect coral ecosystems.	No explanation needed.
Objective A1.3: Use existing incentive programs and strengthen partnerships with USDA and local Department of Agriculture, EPA, Public Health and EQB to provide incentives and ensure compliance with regulations at the same time.	LBSP Objective 3.2: Build partnerships among local, state, federal, and nongovernmental entities to identify, leverage and apply financial and other resources to facilitate improved coastal and upland watershed management to protect coral reef ecosystems from impacts of land-based sources of pollution.  LBSP Objective 3.3: Support or help develop intergovernmental mechanisms (appropriately designed for each jurisdiction) to promote effective local management actions and decisions.	Improved coordination and partnership between the various agencies and programs in Puerto Rico that regulate development issues will improve understanding of and therefore compliance with existing development regulations. This is a component of improved coastal and upland watershed management.

<sup>2</sup> On December 1, 2009, Law 161 was approved. This law establishes the legal and administrative procedures for permit processing. In December 2010, the new permitting agency in Puerto Rico (Oficina de Gerencia de Permisos (OGPe) was established. This agency did not exist at the time that these goals and objectives were developed. Coral reef managers in Puerto Rico should consider the need for coordination with this agency when working to develop any implementation plans for these priorities.

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL A1. IMPLEMENT LAND-USE PLANNING AT THE WATERSHED SCALE TO MINIMIZE WATER QUALITY IMPACTS TO THE CORAL REEF ECOSYSTEM. <sup>2</sup></b>		
Objective A1.4: Ensure that planning activities are at watershed scale and loss of coastal habitats (wetlands, seagrass) that serve as filters to maintain water quality is avoided and minimized.	<p>LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.</p> <p>LBSP Objective 1.2: Identify and prioritize coastal and upland areas for preservation, protection, and restoration based on the coral reef ecosystems and associated watershed areas identified in LBSP Objective 1.1.</p>	No explanation needed.
<b>GOAL A2. CONTROL AND REDUCE POLLUTANT TRANSPORT TO THE MARINE ENVIRONMENT.</b>		
Objective A2.1: Eliminate combined sewers where stormwater and wastewater systems are joined to reduce overflows and associated water quality impacts to water bodies (i.e., San Juan, Boqueron, Calle Calaf).	LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.	Where applicable, this objective should be included in watershed management plans and LAS. The elimination of these combined sewers represents the implementation of a specific best management practice (BMP) to reduce LBSP.
Objective A2.2: Upgrade wastewater treatment plants to eliminate discharges to the sea unless plants become tertiary or other treatment options, such as treatment wetlands and other improvements to discharge quality, are completed.	LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.	Where applicable, this objective should be included in watershed management plans and LAS. Upgrading wastewater treatment plants represents the implementation of a specific BMP to reduce LBSP.

Table 2 continued

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL A2. CONTROL AND REDUCE POLLUTANT TRANSPORT TO THE MARINE ENVIRONMENT.</b>		
<p>Objective A2.3: Support the development of measurable standards that create allowable levels of nutrient and fecal loading to inland and coastal water bodies. This should build from the current EQB initiative to write standards for contaminant loading to inland water bodies by extending the standard to coastal areas. Improve aquatic life criteria based on data for Puerto Rico, where possible, to make marine and coastal water quality standards appropriate for marine organisms.</p>	<p>LBSP Objective 3.4: Ensure that the necessary and consistent regulatory and programmatic framework exists and is enforced to implement watershed management strategies necessary to protect coral ecosystems.</p> <p>LBSP Objective 2.2: Develop, test and apply existing or new management tools and technologies that demonstrate the ability to support and promote coral reef protection and recovery, including approaches to remove accumulated pollutants and/or macroalgae to restore healthy environmental and ecosystem conditions.</p>	<p>The development of measurable water quality standards for coastal areas would provide a new management tool that serves as a regulatory mechanism by which to evaluate and manage LBSP.</p>
<p>Objective A2.4: Establish water quality monitoring stations in coral reef ecosystem areas and add water quality monitoring components to established coral monitoring sites around Puerto Rico. Establish standards in terms of what to monitor for and how to ensure comparability of data across locations. Use data regarding areas where water quality is an issue to enhance agency decision-making related to issuance of permits.</p>	<p>LBSP Objective 1.4: Promote an integrated effort to fill strategic science gaps that directly inform management decisions related to planning and implementation activities in priority coral reef ecosystems and associated watersheds.</p> <p>LBSP Objective 1.5: Determine the efficacy of management activities through coordinated baseline and performance monitoring to assess progress and adapt management actions as needed.</p>	<p>No explanation needed.</p>
<p>Objective A2.5: Implement sediment reduction practices and stormwater management plans that take a holistic watershed approach, considering the interaction between upland actions and their impacts on the marine environment, including seagrass and mangroves.</p>	<p>LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.</p>	<p>No explanation needed.</p>

Table 2 continued



Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL A3. STRENGTHEN ENFORCEMENT AND ENGAGE STAKEHOLDERS THROUGH EDUCATION TO REDUCE POLLUTANT TRANSPORT TO THE CORAL REEF ECOSYSTEM.</b>		
Objective A3.1: Reduce erosion from any earth movement activities (e.g., development, home expansion, agriculture) through a mix of education and enforcement.	<p>LBSP Objective 3.4: Ensure that the necessary and consistent regulatory and programmatic framework exists and is enforced to implement watershed management strategies necessary to protect coral ecosystems.</p> <p>LBSP Objective 3.5: Increase public and political awareness and understanding of the ecological and socioeconomic impacts of land-based pollution on coral reef resources to promote better stewardship and informed decisions regarding activities in watersheds that may adversely impact coral reef ecosystems.</p>	No explanation needed.
Objective A3.2: Improve the efficiency of the implementation of the regulations related to the control of erosion and sedimentation and storm water runoff at the Commonwealth and federal levels.	LBSP Objective 3.4: Ensure that the necessary and consistent regulatory and programmatic framework exists and is enforced to implement watershed management strategies necessary to protect coral ecosystems.	No explanation needed.
Objective A3.3: Ensure that mitigation plans are properly implemented and that the project has not resulted in the loss of habitat and take necessary enforcement action for noncompliance with mitigation plan. Coordinate between EPA, COE, EQB, etc., to ensure enforcement is geared toward protecting habitat and less toward issuing fines.	None	
Objective A3.4: Create certification program for developers, contractors, agricultural operators and consultants certifying that they have been trained in best management practices for different land uses appropriate to their activities.	LBSP Objective 3.5: Increase public and political awareness and understanding of the ecological and socioeconomic impacts of land-based pollution on coral reef resources to promote better stewardship and informed decisions regarding activities in watersheds that may adversely impact coral reef ecosystems.	The proposed BMP certification program would increase the understanding among developers, contractors, agricultural operators and consultants of the impacts of LBSP on coral reef resources and how the implementation of BMPs reduces those impacts.

Table 2 continued

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL A3. STRENGTHEN ENFORCEMENT AND ENGAGE STAKEHOLDERS THROUGH EDUCATION TO REDUCE POLLUTANT TRANSPORT TO THE CORAL REEF ECOSYSTEM.</b>		
<p>Objective A3.5: Recruit enforcement personnel with a commitment to conservation and sustainable development of coastal and marine resources. Provide all law enforcement officials (rangers, lawyers and judges) with educational opportunities to increase their effectiveness and efficiency at implementing conservation and resource management regulations.</p>	<p>LBSP Objective 3.1: Ensure that coral reef jurisdictions have adequate resources and capacity to develop and implement management plans, assess water quality and coral reef ecosystem condition, enforce regulations and evaluate performance.</p>	<p>No explanation needed.</p>
<b>GOAL B1. PROTECT CORAL REEF ECOSYSTEM FROM LARGE- AND SMALL-SCALE FISHERIES IMPACTS THROUGH AN INFORMED PLANNING PROCESS.</b>		
<p>Objective B1.1: Identify, designate and implement a minimum of 3% of the insular platform as no-take marine reserves in compliance with Resolution Number 307 and prepare management plans in collaboration with communities as practicable for these reserves. The areas to be designated should be concerned with the protection of coral reefs ecosystems.</p>	<p>Fishing Objective 2.3: Using outputs of Fishing Objective 2.1 and 2.2, appropriate models and socioeconomic considerations, identify MPAs that require increased protections or improved management, and areas to be considered for siting of new MPAs that protect key coral reef ecosystem components and functions.</p> <p>Fishing Objective 2.4: Work with relevant agencies, offices and communities to create, implement and improve the management of MPAs that protect key coral reef ecosystem components and functions.</p>	<p>No explanation needed.</p>
<b>GOAL B2. ENHANCE ENFORCEMENT AND MANAGEMENT PROGRAMS TO REDUCE FISHING IMPACTS TO CORAL REEF ECOSYSTEMS.</b>		
<p>Objective B2.1: Enhance the fisheries data collection programs.</p>	<p>Fishing Objective 1.3: Obtain essential life history and ecological information on key species or functional groups to support management actions.</p> <p>Fishing Objective 1.4: Obtain necessary information on fishing efforts in U.S. coral reef ecosystems by measuring fishing intensity, fishing mortality, frequency, area coverage, community dependence, etc., to inform management activities.</p>	<p>No explanation needed.</p>

Table 2 continued

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL B3 UTILIZE ENFORCEMENT AND EDUCATION TO ENCOURAGE PUBLIC COMPLIANCE WITH FISHING REGULATIONS AND REDUCE IMPACTS OF FISHING.</b>		
Objective B3.1: Create an outreach and educational campaign to reduce fishing impacts over coral reef ecosystems aimed at: the recreational fishing community, commercial fishing community and the judicial system.	Fishing Objective 4.3: Develop targeted, locally relevant outreach and communication strategies to increase community understanding and support for regulations to protect key coral reef ecosystem species/functional groups and expanded use of marine protected areas.	No explanation needed.
Objective B3.2: Provide education to enforcement personnel strengthening their understanding of impacts from recreational and maritime uses on coral reef ecosystems	Fishing Objective 3.2: Strengthen local agency and community capacity for effective and consistent enforcement of regulations or behaviors that reduce impacts of fishing on coral reef ecosystems.	No explanation needed.
<b>GOAL C1. MANAGE THE RECREATIONAL AND MARITIME USES OF MARINE AND COASTAL AREAS TO REDUCE THE IMPACTS ON CORAL REEFS.</b>		
Objective C1.1: Reduce the impact of vessel anchoring and boat grounding on seagrass beds and coral reefs and enable efficient enforcement by: Establishing vessel use zones; Installing navigation and mooring buoys that demarcate different use zones; Rerouting large vessel traffic to avoid sensitive coral areas, if navigation aids are not effective and/or if there are repetitive groundings; and, Establishing no-anchor zones.	None	

Table 2 continued

SECTION FOUR: LINKAGES TO NOAA'S NATIONAL GOALS AND OBJECTIVES

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<b>GOAL C1. MANAGE THE RECREATIONAL AND MARITIME USES OF MARINE AND COASTAL AREAS TO REDUCE THE IMPACTS ON CORAL REEFS.</b>		
Objective C1.2: Identify specific areas for recreational use. Should focus on already impacted reefs and artificial reef sites so as to preserve and limit activities on higher quality reef ecosystems.	None	
Objective C1.3: Develop outreach programs for recreational operators to encourage compliance with coral reef regulations and to use best management practices for recreational use in their operations.	None	
Objective C1.4: Develop outreach programs for commercial and maritime operators to encourage compliance with coral reef regulations.	None	
Objective C1.5: Prepare and implement a coordinated approach that describes how to respond to physical impacts (vessel groundings, anchor damage, storm damage, etc.) so all the pertinent laws and regulations can be properly enforced	None	

Table 2 continued

Puerto Rico's Priority Goals and Objectives	NOAA's National Goals and Objectives for Coral Reef Conservation	Explanation of Correlation (as needed)
<p>GOAL C2. ENABLE AND PROMOTE SUSTAINABLE DEVELOPMENT PRACTICES IN THE COASTAL ZONE AND UPLAND AREAS OF PUERTO RICO THAT ARE ASSOCIATED WITH PRIORITY CORAL REEF AREAS.</p>		
<p>Objective C2.1: Develop a land-use plan for Puerto Rico that includes the Puerto Rico Coastal Zone as defined by the PR Coastal Zone Management Program (PRCZMP) (including territorial waters) and identifies zones for different uses including conservation, recreation and different types of development.</p>	<p>None</p>	<p>Puerto Rico Objective 3B1 calls for land-use planning and zoning at an island-wide scale, which is different than watershed management planning.</p>
<p>Objective C2.2: Identify and prioritize coastal and upland areas associated with priority coral reef areas for land acquisition, preservation, protection and restoration, such as important watershed areas or buffer areas adjacent to protected areas.</p>	<p>LBSP Objective 1.1: Identify and prioritize those coral reef ecosystems and associated watersheds, within each jurisdiction, that will benefit the most from implementing management conservation strategies to reduce land-based sources of pollution.</p> <p>LBSP Objective 1.2: Identify and prioritize coastal and upland areas for preservation, protection, and restoration based on the coral reef ecosystems and associated watershed areas identified in Objective 1.1.</p>	<p>No explanation needed.</p>
<p>Objective C2.3: Support the effective management of existing protected areas (such as natural reserves, state forests, national parks and wildlife refuges) within or adjacent to priority coastal areas, including the development and implementation of management plans.</p>	<p>Fishing Objective 2.4: Work with relevant agencies, offices and communities to create, implement and improve the management of MPAs that protect key coral reef ecosystem components and functions.</p> <p>LBSP Objective 1.3: Implement watershed management plans and relevant Local Action Strategies (LAS) within priority coral reef ecosystems and associated watersheds to improve water quality and enhance coral reef ecosystem resilience. Where needed, develop (or update) watershed management plans that incorporate coral reef protection measures.</p>	<p>Puerto Rico Objective 3B3 addresses both MPAs and watershed management planning should the protected site on land be interested in approaching planning from a watershed perspective.</p>
<p>Objective C2.4: Increase the capacity of development permitting agencies (DNER, EQB, JP, ARPE, USACOE, USEPA) to monitor development activity and ensure permit compliance.</p>	<p>LBSP Objective 3.1: Ensure that coral reef jurisdictions have adequate resources and capacity to develop and implement management plans, assess water quality and coral reef ecosystem condition, enforce regulations and evaluate performance.</p> <p>LBSP Objective 3.3: Support or help develop intergovernmental mechanisms (appropriately designed for each jurisdiction) to promote effective local management actions and decisions.</p>	<p>No explanation needed.</p>

Table 2 continued

# APPENDIX ONE: PRIORITY SETTING PROCESS PARTICIPANTS

## Core Group: coral reef managers.

In consultation with the territorial point-of-contact, additional individuals were invited to the workshop as technical experts. Each member of this group was invited to attend the workshop, to partake in an interview prior to the workshop and to participate in document revisions.

### Workshop Attendees:

Aida Rosario	DNER–Bureau of Fish & Wildlife
Miguel Garcia	DNER–Bureau of Fish & Wildlife (Day 1 only)
Craig Lilyestrom	DNER–Bureau of Fish & Wildlife
Damaris Delgado	DNER–Bureau of Coasts, Reserves and Refuges
Hector Horta	DNER–Bureau of Coasts, Reserves and Refuges (Day 2 only)
Norma Lozada Rosado	DNER–Bureau of State Forests
Felix Salas	DNER–Bureau of Enforcement
Lisamarie Carrubba	NOAA NMFS–Protected Resources
Pedro de Leon	Puerto Rico Conservation Trust
Rose Ortiz	PR Planning Board
Maryguel Fuentes	PR Planning Board
Denise Laabes	EQB
Ernesto Diaz	DNER–Bureau of Coasts, Reserves and Refuges (Day 2 only)

### Absent from Workshop:

Annette Feliberty	EQB–Water Quality Area
Maria V. Rodriguez	EQB–Land Contamination Control
Max L. Vidal Vázquez	PR Planning Board–Director, Land Use Plans Subprogram
Rodrigo Matta	DNER–Bureau of State Forests
Jorge Baez	Puerto Rico Conservation Trust–Executive Director
Robert Matos	DNER–Bureau of Coasts, Reserves and Refuges

**Advisors: managers of jurisdictions and populations impacting Puerto Rico’s coral reefs.**

Each member of this group was invited to interview prior to the workshop and to participate in document revisions.

Graciela Garcia-Moliner	Caribbean Fishery Management Council
Beatriz D’Narvarte	Puerto Rico National Parks Company
Jennifer Moore	NOAA NMFS–Protected Resources
Aitza Pabon	NOAA NMFS–Protected Resources
Jose Laureano	San Juan Bay Estuary Program
Jorge Bauza	San Juan Bay Estuary Program
Aileen Velazco	DNER–Bureau of Coasts, Reserves and Refuges
Carl Soderberg	EPA
Marisol Morales	USDA–NRCS
Susan Silander	USFWS

**Science Advisors: members of the scientific community with specific expertise issues relating to Puerto Rico’s coral reefs.**

Each member of this group was invited to review documents in preparation of the workshop as well as drafts of the Priority Setting Document.

Beverly Yoshioka	USFWS Div. of Ecological Services
Carlos Diez	DNER
Sean Griffin	NOAA Restoration Center
Tom Moore	NOAA Restoration Center
Manuel Valdes-Pizzini	UPR–CIEL
Ruperto Chaparro	PR Sea Grant
Edwin Hernandez	UPR–Rio Piedras
Reni Garcia	UPR–Mayaguez
Rich Appeldoorn	UPR–CCRI
Alberto Sabat	UPR–Rio Piedras
Eileen Alicea	NOAA–CRCP
James Byrne	TNC
Felix Martinez	NOAA–NCCOS
Ron Hill	NOAA–SEFSC
Todd Kellison	NOAA–SEFSC
Juan Agar	NOAA–SEFSC
Jim Hendee	NOAA–OAR–AOML
Julio Morell	Caribbean Regional Association (CaRA)
Jorge Corredor	Caribbean Regional Association (CaRA)

# APPENDIX TWO: CONTEXT

The Situation Analysis is a preparatory document that summarizes coral reef threats, condition and trends; key management issues; and key agencies' management goals. As an initial step in the priority setting process, the Situation Analysis was used ahead of meetings and interviews to provide a reference point and boundary for priority setting discussions with coral reef managers in Puerto Rico. The documents that make up the basis of this analysis were identified during interviews with coral reef managers in Puerto Rico and via a desk review of existing management plans from those agencies that are responsible for or affect Puerto Rico's coral management. The coral reef managers interviewed for this study were identified by the NOAA CRCP team with input from the NOAA CRCP point of contact in Puerto Rico and included NOAA CRCP, NOAA–National Marine Fisheries Service (NMFS), NOAA–NMFS/Caribbean Fisheries Management Council, U.S. Fish and Wildlife Service, U.S. Dept. of Agriculture–Natural Resources Conservation Service, Puerto Rico Department of Natural and Environmental Resources (DNER)–Bureau of Fish and Wildlife, DNER–Bureau of Coasts, Reserves and Refuges, DNER–Bureau of State Forests, DNER–Bureau of Enforcement, Environmental Quality Board (EQB), Puerto Rico Planning Board, San Juan Bay Estuary Program and Puerto Rico Conservation Trust.

The Situation Analysis identified the following issue areas—which reflect both specific threats as well as tools to mitigate threats—as those that were most commonly referred to in the documents reviewed. These results are listed in no particular order.

**Regulatory and Enforcement** refers to the need for more and more effective law enforcement

and surveillance personnel. Current laws and regulations do not deter individuals or groups from carrying out prohibited actions. Emphasis is given on the need for a solid enforcement structure, increased cooperation and greater consistency.

**Construction and Human Activities** refers to problems related to near-shore construction and project developments conducted without required permits, or conducted without using sustainable development practices. Aspects of this issue include increased erosion, land runoff and pollution, sediment discharge and obstruction of public beach access. Also, the impending effect of light pollution, particularly during turtle nesting seasons, is of concern. The need to reduce the impacts of recreational use on coral reef resources and to promote appropriate uses is also addressed in this area.

**Natural Habitats and Research** covers areas related to conservation of natural habitats, research and scientific investigation of marine and coastal habitats. This includes research conducted on ecosystem health and ecology, trends and impact assessments. Such information is critical to resource managers in their efforts to preserve and sustain natural habitats and resources.

**Education and Outreach** refers to the need to educate all users, both residents and visitors, of the importance of, threats to, and impacts of human activities on the coral reef ecosystem. The opportunities for this are varied and include, but are not limited to, classroom visits, community outreach activities, availability of educational material—Power Point presentations, pamphlets, videos and photographs—and availability of



materials regarding laws and regulations of coastal and ocean resources.

**Moorings** refers to reducing the impact of vessel anchoring and boat grounding on seagrass beds and coral reefs by installing navigation and mooring buoys. This is a common issue addressed in areas high in recreational boat users.

**Zoning** refers to the need to establish a system of marine spatial planning, including marine reserves and marine protected areas, to address multiple resource needs and concerns by geographic partitioning. Techniques include setting visual markers and/or maps to separate areas considered to be critical and in need of restoration from those that may be used for recreational activity and fishing. This is considered to be critical for areas where fish stocks have been depleted and reefs are in need of recovery.

**Habitat Restoration** is needed in many critical habitats that have been damaged by human-induced and/or natural causes. Restoration efforts may include reforestation, re-introduction of native species (flora and/or fauna) and restoration of sand dunes. Monitoring and possible removal of invasive species would also be part of the restoration efforts to help restore the balance and integrity of natural habitats.

**Water Quality** addresses issues related to problems involving high sediment load in rivers and coastal waters, high nutrient input and land-based sources of pollution. Wastewater management was a critical issue brought up since it is a common source of nutrient input in coastal waters, and harmful to the health of coral reefs.

**Land-Based Sources of Pollution** refers to the introduction of foreign materials resulting from activities in adjacent watersheds that have the potential to affect the marine environment. This includes any upland development, marine dredging and marina construction. Land-Based Sources of Pollution are most commonly



*Stoplight parrotfish congregate on a reef in Mayagüez. Photo Credit: Dr. Jorge García and Jorge Sabater*

the result of construction, such as runoff and discharge from developed areas.

**Fishing** encompasses issues related to fish stocks, impacts on fisheries and coral reef habitat from gear and overfishing, enforcement of fishing regulations, reducing user conflicts and education about all aspects of fishing—impacts, gear restrictions, open/closed seasons, etc. A great deal of emphasis is placed on socioeconomic impacts of fisheries restrictions as well as the need for greater cooperation among stakeholders.

**Climate Change** addresses issues related to climate change such as sea level rise, coastal erosion, ocean acidification, coral diseases and bleaching and increased sea-surface temperature and associated impacts to organisms within coral reef ecosystems. This is a new theme, not commonly addressed in management plans but one that will potentially become a priority issue. Climate-change mitigation and adaptation plans are issues that are beginning to emerge in management planning.

# APPENDIX THREE: PRELIMINARY IDENTIFICATION OF CAPACITY GAPS

During the interviews with coral reef managers in Puerto Rico, facilitators made an effort to understand the working relationship between managers and management documents. Facilitators noted and identified challenges to and current deficiencies in achieving stated goals and objectives, noting specific capacity gaps that likely will need attention.

The Coastal Resources Center at the University of Rhode Island developed and applied common tools for comparative assessments of coastal ecosystem governance. This approach involves three categories, phrased as key statements, for enabling conditions that allow an initiative to successfully execute a sustained plan of action designed to influence the course of events in an ecosystem.

The three categories are: constituencies, commitment and capacity. This baseline will also identify the immediate capacity gaps that are directly related to implementing this strategic approach. These gaps will be explored further, and a capacity assessment will be developed in phase II of this effort, beginning in fiscal year 2010.

## CONSTITUENCIES

### Premise:

To achieve success, a core of well-informed and supportive **constituencies** comprised of stakeholders in both the private sector and government agencies must actively support the program.

### Measures:

1. The user groups who are affected by your program understand and support the goals, strategies and targets.
2. There is public support for your program.
3. The institutions that assist in implementing your program, or the institutions that are affected by the plan, understand and support it.

### Results:

One of the greatest challenges is the lack of understanding by the user groups about the value and importance of the coral reef system. Nearly every interviewee noted that there should be a concerted and comprehensive effort to connect resource users, regulators, decision-makers and communities to the resource. It was noted several times that certain key stakeholders don't connect pollution flowing from within the watershed to degraded coral reefs. There continues to be a high rate of noncompliance by the construction industry, which is one of the most important regulated communities.

## COMMITMENT

### Premise:

To achieve success, it is necessary that the delegated authorities have expressed **commitment** to the policies of a program and to the allocation of financial resources required for long-term program implementation.

### Measures:

1. The appropriate level of government has formally approved the plan of action.
2. The government provided the program with the authorities it needs to successfully implement its plan of action.
3. Sufficient financial resources have been committed to fully implement the program over the long-term.

### Results:

There was near uniform agreement that Puerto Rico has a strong regulatory framework in place that, if implemented, would address most if not all of the threats to the coral reefs. These rules have been formally adopted and promoted according to the laws and procedures of Puerto Rico. However, there was little indication that the necessary financial resources have been committed to fully or even partially implement these rules and regulations. This has created a sense of frustration by those who are responsible for enforcing the management plans and related regulations.

## CAPACITY

### Premise:

To achieve success, it is necessary for sufficient **capacity** be present within the institutions responsible for the program to implement its policies and plan of action.

### Measures:

1. Your program possesses the human resources to implement its plan of action.
2. Your program possesses the institutional resources (equipment, materials, etc.) to implement its plan of action.
3. There are internal or external barriers to successfully implement plan of action. What are these?



*A stand of threatened staghorn coral in Culebra. Photo Credit: Carlos Rosario*

### Results:

This assessment was done in close proximity to a substantial downsizing of staff at DNER. This has created a massive gap in overall capacity, including enforcement capabilities and underscores the fact that the necessary human resources, especially for enforcement and prosecution, to effectively manage coral resources in this complex environment are low. There was general agreement that most of the institutional resources (equipment, materials, etc.) are available to support critical functions. In addition to the lack of human capacity, it was noted that coordination between different agencies could be improved and that general awareness about what other programs—at all levels of government—are doing to protect corals is necessary.

This initial assessment will be followed by a more detailed assessment and analysis that will focus on capacity gaps in relation to the specific management goals and objectives that are finalized by the priority setting process.

# APPENDIX FOUR: LIST OF ACRONYMS

ARPE:	Administración de Reglamentos y Permisos
CAFO:	Confined Animal Feeding Operation
CaRa:	Caribbean Regional Association
COE/USACOE:	United States Army Corps of Engineers
DA:	Department of Agriculture (Puerto Rico)
DNER:	Department of Natural and Environmental Resources (Puerto Rico)
EQB:	Environmental Quality Board (Puerto Rico)
FEMA:	Federal Emergency Management Administration
FHWA:	Federal Highway Administration
LAS:	Local Action Strategy
NGO:	Non-governmental Organization
NOAA:	National Oceanic and Atmospheric Administration
CRCP:	Coral Reef Conservation Program
NMFS:	National Marine Fisheries Service
NCCOS:	National Centers for Coastal and Ocean Science
SEFCS:	Southeast Fisheries Science Center
OAR–AOML:	Oceanic and Atmospheric Research–Atlantic Oceanographic and Meteorological Lab
NRCS:	Natural Resources Conservation Service
OSDS:	On Site Sewage Disposal
POC:	Point of Contact
PRCZMP:	Puerto Rico Coastal Zone Management Program
PRPB:	Puerto Rico Planning Board
TNC:	The Nature Conservancy
UPR:	University of Puerto Rico
CCRI:	Caribbean Coral Reef Institute
CIEL:	Centro Interdisciplinario de Estudios del Litoral
USDA:	United States Department of Agriculture
USEPA:	United States Environmental Protection Agency
USFWS:	United States Fish and Wildlife Service
USVI:	United States Virgin Islands

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