CHAPTER 7:
Reducing the Impacts of Coastal Uses

Goal:

Reduce the impact of human coastal activities on coral reef ecosystems.

Coral reef ecosystems are being continually, and in some cases, irreparably damaged by a number of human activities. For example, dredging for navigation or marinas, beach re-nourishment, pipeline and cable installation, and coastal development and modification projects can degrade water quality in nearshore habitats. In addition, although reefs contribute to tourism revenues, a boom in coastal tourism can lead to direct impacts (i.e., diving, fishing, and recreational boating) and indirect impacts (i.e., increasing demand for coastal development, sewage discharge, and vessel traffic) on coral reef resources, compounding the adverse effects of coastal development. As the number of people using and transiting coral reef areas has increased, so too has the damage from careless snorkeling and diving practices (handling and breaking coral, leaving refuse, etc.) and increases in vessel groundings, which damage coral reef ecosystems by destroying habitat, releasing pollutants, and displacing resident

Coastal construction in Miami, FL.

fish and other wildlife. In addition, scarring from propellers and anchors and other physical impacts are an increasing concern in nearshore habitats. Adequate planning and the consistent and proactive application of existing state and federal authorities and programs can reduce the adverse impacts of coastal development, shoreline modification, vessel groundings, tourism, and other coastal uses.

Accomplishments by Objective

Objective 1: *Develop informal guidance, protocols, and technical assistance programs to reduce the risks of damage to coral reefs resulting from federal agency activities.*

In Florida, impacts to nearshore and coral reef resources from maritime and coastal uses are a priority concern, so the State developed a special focus Local Action Strategy (LAS) to address these issues—The Florida Maritime Industry and Coastal Construction Impacts (MICCI) LAS. The MICCI focus team, which oversees the development and implementation of projects for this LAS hosted a workshop to: *Identify and Evaluate Existing and Emerging Innovative Technologies, Construction Practices, and Procedures that Minimize or Eliminate Coral Reef Impacts.* This two-day workshop focused on investigating innovative and emerging technologies in coastal construction practices serving to minimize or eliminate impacts to coastal habitats and resources. Over 70 representatives attended from the coastal construction industry, regulatory agencies, environmental agencies, non-governmental organizations, and academic institutions involved with or interested in dredging, coastal and nearshore construction, infrastructure installation, beach re-nourishment, and shoreline stabilization. The proceedings from the workshop and final study report are available online: http://www.dep.state.fl.us/coastal/programs/coral/reports/, and will be instrumental in a follow-up LAS effort to develop best management practices for construction, dredge and fill, and other

permitted activities conducted near coral reefs. To increase preparedness and capacity to respond to coral reef damage events in the Pacific, NOAA hosted two workshops for Pacific state and territory partners on natural resource damage assessment (NRDA)—one for managers and one for practitioners. The workshop introduced participants to the principles of NRDA and discussed examples of acute and chronic damage events specific to the Pacific Islands. The 35 participants, from Hawai‘i, Guam, CNMI, American Samoa, and California, developed NRDA plans and processes for a vessel grounding and oil spill case study while considering a variety of issues, including damage to beaches, coral reefs, and special status species; planning for injury quantification studies; and working in case teams.

In general, storm water control projects in Hawai‘i have impacted the nearshore and coral reef ecosystem conditions. In 2003, the U.S. Army Corps of Engineers (USACE) and the State of Hawai‘i completed a Watershed Analysis as part of the General Investigation Study for the Ala Wai Canal Project. Ala Wai Canal feeds directly into nearshore areas having coral reef habitat. The feasibility study is scheduled to be completed in 2009. Additional studies are proposed to start in 2008 in the West Maui Watershed, Anahola Watershed, Maunalua Regional Watershed, Kekaha/Waimea Watershed, and Waialua-Kaika Watershed. The purpose of these studies was to determine the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses and related land resources. In general, studies include a watershed assessment with recommendations to improve watershed health, including marine ecosystems, in a coordinated fashion.

The USFWS, NOAA, EPA, USACE, Navy, Hawai‘i, Guam, CNMI, and American Samoa participate as members of the Pacific Region Interagency Working Group (PRIWG) for Coral Reef Mitigation. This working group was formed in response to a resolution of the USCRTF and is intended to improve the performance of resource agencies and share mitigation and restoration tools, techniques, and lessons learned. In 2006, the PRIWG developed a Coordination and Management Plan as general guidance for agency member interaction. This plan identifies group goals, objectives, and priorities in support of the effort to coordinate, review, and develop consistent measures for evaluating and implementing mitigation programs addressing impacts to coral reefs resulting from any federal action.

The USACE is a member of the Permanent International Association of the Navigation Congress (PIANC). Through the Permanent Environmental Commission Working Group #15—Dredging and Port Construction around Coral Reefs, a working group of international scientists, engineers, regulators, and industry representatives addresses the impacts of dredging and port construction on shallow, warm-water coral reefs through development of a PIANC-sponsored publication to benefit industry and resource managers worldwide. The USACE shares mitigation and restoration tools, techniques, and lessons learned.

Objective 2: *Strengthen federal and state permitting and management programs for coastal development activities affecting coral reef habitats to minimize or prevent adverse impacts on coral reef ecosystems.*

The USACE is responsible for reviewing and evaluating permit applications where construction and other activities (e.g., discharge of dredged and fill material) may

Coral surveys conducted by Navy civilian ecologist in Apra Harbor in Guam.

occur in navigable waters of the United States. As part of the application review process, the USACE coordinates the various project proposals with federal, state, and local agencies; territories; tribal liaisons; and the interested public in an effort to identify potential project issues. In coral reef regions, the USACE works closely with other USCRTF members to ensure proposed activities are in the overall interest of the public. Where practicable, projects may be modified to avoid or minimize impacts on aquatic resources of the United States, including special aquatic sites, such as coral reefs, mangroves, and seagrass beds. Additional impacts may be further reduced or offset by compensatory mitigation, which may include restoring, enhancing, creating, and preserving the aquatic functions and values at risk of loss. In general, mitigation is developed in accordance with the Clean Water Act Section 404(b)(1) evaluation, the 1990 USACE-EPA Mitigation Memorandum of Agreement, and USACE Regulatory Guidance Letters. These and other documents are available online at: http://www.usace.army.mil/cw/cecwo/reg/rglsindx.htm. As discussed under Objectives 5 and 6 of this Chapter, the USACE and the EPA have published a proposed mitigation rule to promote "no net loss" of aquatic resources while providing greater flexibility for completing mitigation in a watershed context.

In addition, the USACE districts are further encouraged to develop local agreements in accordance with the national strategies. For example, the Honolulu District developed Compensatory Mitigation and Monitoring Guidelines (dated February 14, 2005), which are available online at: http://www.poh.usace.army.mil/pa/publicNotices/SPN20050214%2004-448.pdf. These guidelines, coordinated with federal resource agency partners, were developed in accordance with current national policy for all types of aquatic mitigation—not just wetlands or corals. The guidelines were

Sumay Cove Area adjacent to the Inner Apra Harbor, Guam.

used to evaluate the Navy's proposal for compensatory mitigation for 7.1 acres (28,733 square meters) of coral impacts associated with the improvements to Alpha-Bravo Wharves, Apra Harbor, Guam.

Although no formal local interagency agreements were developed in the course of the USACE permit evaluation of the Navy's Alpha-Bravo Wharves improvement project, extensive coordination with the Navy, EPA, NOAA, USFWS, and Guam Department of Agriculture was conducted to identify the most suitable compensatory mitigation plan to offset impacts to the 7.1 acres of coral resources within the Inner Apra Harbor entrance channel, Apra Harbor Naval Complex, Guam. The USACE anticipates that interagency discussions related to this permit action will serve as a model for developing a comprehensive mitigation plan for future Navy activities on Guam. There is no established mitigation mechanism (i.e., mitigation bank or in lieu fee program) or, for project-specific mitigation, any agreement that mooring buoys, coral transplantation, upland reforestation, etc., are the standard accepted practice to compensate for coral impacts on Guam.

The U.S. Coast Guard (USCG) is coordinating with Broward County, Nova Southeastern University Oceanographic Center—National Coral Reef Institute, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, NOAA, USACE, and other agencies to relocate the anchorage located offshore of Port Everglades. The existing anchorage is located between two reef lines off the coast of Broward County, Florida. In the past 14 years, more than11 acres (44, 515 square meters) of coral reef have been damaged due to ship groundings in the area. There is also extensive unquantified damage from anchor and cable drags over the reef. The anchorage relocation would move large vessels away from the shallow-water reefs and is anticipated to be authorized by the USCG in 2007.

Case Study:

Reducing Impacts of Human Activities on Coral Spawning The USCRTF passed a resolution in 2004 calling for member agencies to assess potential impacts of human activities conducted in the coastal zone on coral reproduction and recruitment. Many species of coral reproduce by releasing massive numbers of eggs and sperm into the water column. In an effort to enhance fertilization and coral recruitment success, the Coral Spawning Resolution calls for the identification and modification of the type or timing of activities that introduce nutrients, toxic chemicals, and suspended particles into coral reef ecosystems.

A Pacific Interagency Working Group was formed and includes NOAA, USFWS, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and USACE, along with other academic and state/territory partners. This working group has been instrumental in promoting and coordinating the following projects and efforts:

Obtained federal approval of CNMI Water Quality Standards providing protection to corals during coral spawning periods and used National Environmental Protection Act compliance and review to curtail coral degradation caused by road development.

The American Samoa EPA included new regulations in their 2005 Water Quality Standards Revision Administrative Rule No. 006-2005. For activities having the potential to adversely affect coral reproduction, a stoppage period of no less than 60 days, starting five days after the October full moon, will be a condition of any permit or water quality certification. (The period following an October full moon is an important time for coral spawning and survival of coral gametes.)

In the Atlantic-Caribbean, data on coral spawning times and coral reproduction have been compiled to help predict coral spawning and larval duration times in Florida and the Caribbean. This information will be provided to managers for use in designing and implementing management activities that consider the impacts to coral reproduction.

Objective 3: *Initiate actions at the national and international levels to prevent vessel groundings.*

Among the many threats to coral reefs, minimizing damage caused by boat anchors is easily achieved by installing mooring buoys. Anchors dropped multiple times at individual sites can produce significant and cumulative impacts on coral reefs. Mooring buoys help to diminish these impacts and encourage a reliable system for vessel operators to secure their vessels. The use of mooring buoys has proven effective in decreasing the number of recreational vessel groundings and reducing the negative impacts of anchor damage on coral reefs. Mooring buoys can also serve as a way to mark—and therefore educate vessel operators about—protected area boundaries. In recent years, mooring buoy programs have gathered momentum and are now widely accepted as an effective solution to habitat degradation caused by anchoring.

In Puerto Rico, at the Desecheo Island Marine Protected Area, eight concrete ballasts were deployed to anchor marker buoys in an effort to identify "hot spots" and install coral reef informational signage for public outreach. Also in Puerto Rico, along Green Beach in Vieques National Wildlife Refuge, the USFWS and USACE installed mooring buoys in areas with heavy transient vessel anchoring. Other areas where mooring buoys and aids to navigation were deployed include La Parguera Natural Reserve, Canal Luis Peña in Isla de Culebra, and at the La Cordillera Natural Reserve. Puerto Rico DNER maintains approximately 270 mooring buoys in coral reefs and seagrass beds within Natural Reserves, and is starting a program to identify sandy areas in Natural Reserves for use as traditional anchorage areas to complement the mooring buoys. DNER recognizes that with 270 mooring buoys and over 60,000 registered vessels, buoys alone will never meet the demand for safe anchorage.

In Guam, the USFWS provided funding and technical assistance to the Guam Division of Aquatic and Wildlife Resources to maintain 34 shallow-water mooring buoys to reduce the impacts of boat anchors on coral reefs.

In 2006, Virgin Islands National Park implemented the storm mooring program to prevent damage to coral reef ecosystems at Hurricane Hole on St. John. Rather than tie their boats to mangrove trees during storms, which damages the mangrove habitat, more than 200 boaters have registered to use the underwater chain moorings installed by the NPS. The Park plans to install 50 additional storm moorings in 2007. The NPS also maintains 223 mooring buoys for overnight and day use, and 14 buoys for fishing and diving at various locations in the Park and the adjacent Virgin Islands Coral Reef National Monument.

The NPS and NOAA, working with local partners in the USVI and the British Virgin Islands, completed instructional visual aids on proper anchoring and mooring techniques aimed at boaters visiting the Virgin Islands National Park and Coral Reef Monument. These guides include regulations on the proper use of anchors and designated anchorage areas.

A specific mooring buoy program—**Anchors Away!**—awards competitive grants to install and maintain mooring buoys to protect sensitive coral reef resources from anchor damage, and to identify marine protected areas in the Gulf of Mexico and the wider Caribbean Region. **Anchors Away!** grants must also include an education component aimed at resource managers, dive operators, local coral reef stakeholders, and others engaged in anchoring. The program is administered by the

National Fish and Wildlife Foundation through the Coral Reef Conservation Fund and is supported by NOAA and the U.S. Department of State (DOS).

NOAA offered a week-long vessel inspection training course for agency personnel in CNMI, Saipan. USCG personnel from Saipan and Guam also attended. Abandoned and derelict vessels are a problem in the waters around the CNMI. Because of the regular typhoons passing through the islands, such derelict vessels often break loose and ground on adjacent coral reefs and seagrass beds. This project provided training in vessel inspection for CNMI boating safety officers to help identify potential problem vessels before they sink or break apart and become a source of marine debris. By keeping unsafe vessels out of CNMI waters, the local agencies hope to reduce coral injury and avoid the much greater expense of vessel and debris removal. This training, conducted by a professional marine surveyor, is part of a larger outreach campaign targeted at boaters to prevent the occurrence of derelict vessels and their resulting marine debris.

Objective 4: *Develop standard vessel grounding response, enforcement, and injury assessment guidance and improve the ability to remove grounded and abandoned vessels and restore damaged habitat by enhancing local and regional emergency response capabilities, strengthening and standardizing enforcement and damage assessment actions, and identifying gaps in existing legal authorities.*

Several USCRTF partners—including NOAA, the USFWS, Hawai‘i, and USCG—hosted a workshop in Honolulu to discuss issues related to hazards planning and vessel groundings in the NWHI. The workshop brought together agencies and response experts to discuss lessons learned from previous groundings and to lay the groundwork for developing a plan to guide future management actions.

Anchors Away! San Andres Mooring Buoys Project in Columbia.

As part of its Maritime Industry and Coastal Construction Impacts Local Action Strategy Committee, Florida hosted a workshop entitled *Rapid Response and Restoration for Coral Reef Injuries in Southeast Florida: Guidelines and Recommendations.* The two-day workshop was held in Fort Lauderdale in February 2006, to examine existing agency emergency response processes and compile technologies and procedures for restoring damaged coral habitats. Over 60 participants attended, including agency representatives from Florida Department of Environmental Protection; Florida Fish and Wildlife Conservation Commission; NOAA; NPS; USACE; USCG; Miami-Dade, Broward, Palm Beach, and Martin counties; as well as non-agency representatives from local and national NGOs and consulting, engineering, and legal firms. Guidance for agency policies involving injuries to reef systems, including technical guidelines for triage and restoration, was developed. The final Guidelines document is available online at: http://www.dep.state.fl.us/coastal/programs/coral/reports/MICCI/MICCI_Project2_Guidelines.pdf.

In March 2006, a federal court approved a U.S. Department of Justice (DOJ)-negotiated settlement in a case addressing coral and seagrass damage resulting from the grounding of the *M/V Evening Star* in Biscayne National Park in 2002. Under the settlement, the vessel owner/operator agreed to pay for a project to remove debris from the impacted coral reefs and also agreed to reimburse the NPS for all of its response and assessment costs related to the event. This project fully compensates the Park for losses associated with the grounding.

NOAA, USCG, and local agencies presented an oil spill and vessel grounding response workshop in Koror, Palau, to representatives of government agencies, industry, and non-governmental organizations. The workshop

Grounding of the East Wind freighter off of a Broward County Beach in Florida.

provided an overview of scientific issues to consider in responding to and evaluating damage from spills and groundings, the roles of NOAA and the USCG in spill response, how U.S. and Palauan response are similar and where they differ, and a review of Palau's national contingency plan. In addition, local speakers presented case studies of events and response efforts. The workshop included joint field visits to locations where resources have been impacted by oil spills and vessel groundings.

Puerto Rico DNER established a draft Administrative Order that created a grounding response team under the Emergency Response Coordination Office. Restoration of coral reefs and associated habitats damaged by vessel groundings is mandated under Puerto Rico Law 147, enacted on July 15, 1999. A contract was signed with a specialized consulting group to provide technical assistance to the grounding response team. Since these actions were undertaken, Puerto Rico DNER has successfully initiated NRDA activities for several major and minor vessel groundings and one major oil spill. Puerto Rico plans to work with NOAA to train new personnel to work with these issues.

Objective 5: *Strengthen existing and develop new resource management programs and protected areas to address the broad range of coastal activities.*

Objective 6: *Develop mitigation guidance for coastal development projects deemed essential by federal, state, and territory agencies.*

Habitat Equivalency Analysis: Its Use and Application

In summer 2005, USCRTF partners sponsored a Workshop on Habitat Equivalency Analysis (HEA) for Coral Reefs. HEA is a methodology that scales the level of project impacts with

an appropriate amount of compensatory mitigation. The workshop was sponsored by the Pacific Islands Regional Mitigation Working Group and conducted as a USFWS National Conservation Training Center course. The course included participants from Hawai‘i, Guam, CNMI, and American Samoa and featured instructors from the USFWS, NPS, NOAA, and USACE.

Application of HEA:

HEA methodology was successfully used on an inter-island ferry terminal project at Lahaina, Maui, Hawai‘i and will be used in upcoming projects that impact coral reef ecosystems.

NOAA, the USFWS, EPA, NPS, USACE, and other resource agencies from the Territory of Guam, have used HEA methodology to assist the U.S. Navy with assessments of planned coral reef resource losses and mitigation options related to proposed Kilo Wharf expansions at Apra Harbor, Guam. Coral reef field assessments and associated reports for Kilo Wharf and potential mitigation sites were completed in 2006. A draft HEA was produced to provide initial guidance on the extent of compensatory mitigation needed to offset potential coral reef habitat losses. Cooperative efforts with additional agencies including, the NRCS and USGS, are also taking place to reduce chronic sedimentation for a heavily degraded coral reef system at Sella Bay. (For more detail see page 95)

In March 2006, the USACE and the EPA published a proposed mitigation rule to promote “no net loss” of aquatic resources. This proposed rule—which is based on existing regulation, guidance, and input from National Research Council documents—provides flexibility for evaluating compensatory mitigation strategies in a watershed context. The proposed rule allows for the:

Replacement of lost aquatic resource functions resulting from permitted activity;

Use of functional assessments where available, appropriate, and practicable, or minimum one-to-one replacement;

Use of strategic site selection to improve or maintain watershed functions;

Consideration of type of mitigation project, landscape position, and other factors to provide desired functions, including use of multiple sites, if appropriate (e.g., on-site for water quality and water storage and off-site for habitat);

Use of preservation and buffers;

Promotion of mitigation banks and in lieu fee programs; and

Implementation of regular monitoring programs to evaluate overall success.

As indicated above, mitigation should be supported by analyses evaluating functional losses and gains. Functional analyses may include, for example, hydrogeomorphic models or HEAs. The rule should be finalized by the end of the 2007.

The USACE is also changing database systems to further support program management and documentation of mitigation monitoring efforts. The USACE is converting to OMBIL Regulatory Module, a database and management tool allowing better tracking of project actions, including both impacts and compensatory mitigation. In addition, this tool is being built to include a spatial database with maps supported by GIS, which will facilitate

Protecting Corals, Saving Ships

NOAA is conducting a pilot project in the Florida Keys National Marine Sanctuary designed to protect coral reef habitats from physical destruction and pollution from ships by converting existing coral, MPA and other marine GIS information into a format suitable for use with shipboard electronic chart systems. When this layer of environmental information (known as Marine Information Objects, or MIOs) is displayed in conjunction with an Electronic Navigational Chart (ENC), it can help alert mariners to sensitive areas and any associated rules and restrictions.

Shipboard electronic chart systems can display warnings and regulations pertaining to protected areas sound alarms if a vessel's projected course is too close to a coral reef or MPA. Automation and integration of these tools can help reduce human error and prevent vessel groundings on coral reefs.

a watershed approach for project evaluation. Once installed, the USACE will work with federal, state, and local parties and the general public to ensure accessibility to the system.

The USACE, with assistance from the University of Hawai'i Sea Grant Extension Service, conducted a workshop at the University of Hawai'i in August 2004 to explore the feasibility of developing a coral reef functional assessment protocol following a structured, model approach. The principal purpose of the workshop was to explore the feasibility of adapting the Hydrogeomorphic (HGM) Approach for use in coral reef ecosystems. The HGM Approach is a reference-based rapid assessment protocol that uses the best scientific information available to develop a series of simple conceptual models to represent the relationship between form and function of the aquatic ecosystem. The final report from the workshop was issued in March 2005.

To mitigate impacts to approximately 59 acres (238,765 square meters) of degraded mangroves wetlands and 95 acres (384,451 square meters) of sparsely vegetated marine habitat, the USFWS, NOAA, USACE, and local partners evaluated a mitigation and monitoring plan for the development of the Port of the Americas in Ponce, Puerto Rico. The Puerto Rico Ports Authority will acquire and preserve a 693 acre (2,804,471 square meters) coastal farm dominated by marsh and mangrove wetlands and coastal beach berm uplands, restore the beach berm area with native trees, and perform other approved projects to mitigate for impacted seagrass beds.