

# Reducing Pollution



**GOAL:** *Significantly reduce the amounts, sources, and cumulative impacts of pollution on coral reefs by fully implementing existing federal and state authorities.*

## Rationale for Action

Healthy coral reefs require good water quality to grow, remain viable, and provide ecosystem benefits. Pollution can threaten reef ecosystems by harming sensitive species, altering species' compositions, disrupting critical ecological functions (e.g., photosynthesis), and impeding the normal settlement and growth of stony corals and other benthic invertebrates. Pollution enters reef ecosystems in many ways, ranging

from such specific point source discharges as sewage pipes and vessels to more diffuse sources such as runoff associated with agriculture, coastal development, road construction, and golf course irrigation. Land-based sources of pollution, including sedimentation, have been identified as top threats to coral reefs. In addition, marine debris has been identified as the primary anthropogenic impact to the otherwise relatively pristine Northwestern Hawaiian Islands (NWHI)

## OBJECTIVES

**OBJECTIVE 1:** Reduce sedimentation and other land-based sources of pollution by implementing conservation management practices in coastal watersheds through public/private partnerships, incentive-based measures, regulatory measures, technical and financial assistance, habitat restoration, and other activities.

**OBJECTIVE 2:** Improve water quality by reducing nutrient discharges from wastewater treatment facilities, vessels, industrial sources, storm water, agricultural sources, and air deposition.

**OBJECTIVE 3:** Reduce chemical pollution (e.g., oil, toxins, hazardous materials) from land-based sources and vessel discharges.


**OBJECTIVE 4:** Reduce the flow of marine debris and remove existing marine debris from reef ecosystems.

**OBJECTIVE 5:** Prevent and control the spread of invasive species (e.g., non-native species) in coral reef ecosystems from ballast water and other mechanisms.

**OBJECTIVE 6:** Develop tools to assess and address the impacts of pollution on coral reefs.

**OBJECTIVE 7:** Increase awareness and understanding of the ecological health and socioeconomic impacts of land-based and marine pollution on reef ecosystems.





coral reef ecosystems. Invasive species<sup>5</sup>, which are considered a type of biological pollution, are increasingly impacting reef areas throughout Hawai'i and other jurisdictions.

Although the sources, characteristics, and impacts of pollution vary widely among U.S. jurisdictions, much of the pollution could be significantly reduced or potentially eliminated by fully implementing existing state and federal regulations and voluntary programs. The USCRTF identified land-based sources of pollution as a priority area for action and implementation of local action strategies (LASs) to address the problem in key watersheds.

## Summary of Implementation

USCRTF member agencies address pollution by developing regulations to limit the types and amount of waste being discharged and by establishing federal/local partnerships to voluntarily implement best management practices within watershed areas. Increasingly, federal, state, and local agencies are using a ridge-to-reef approach to assess inputs from watersheds on reef habitats and evaluate the impact pollution has on reef ecosystems. In order to design management solutions, agencies are conducting multidisciplinary scientific research and developing tools to better identify origins of pollutants, track their movement, and understand their impacts on the environment.

Reduction of land-based sources of pollution is greatly affected by policies and regulations at the local level. Therefore, strategic partnerships among federal, state, and local agencies are important to addressing this problem. The U.S. Environmental Protection Agency (EPA), partnering with the states, implements programs under the Clean Water Act that regulate point source discharges polluting the Nation's waters. These programs address point source discharges from industrial facilities,

municipal wastewater treatment plants, certain agricultural operations, and storm water. In addition, EPA and other USCRTF federal agencies tackle nonpoint source pollution by partnering with states and territories and providing funding and technical assistance through a variety of programs and grant opportunities.

To address nonpoint source pollution, EPA partners with states and territories through voluntary programs like the Nonpoint Source Management Program (Section 319 of the Clean Water Act) to provide technical and financial assistance and educational training, initiate demonstration projects, and support monitoring efforts. NOAA's Coastal Zone Management Program funds projects that address polluted runoff threatening coral reefs and builds federal/state partnerships that encourage the restoration and sustainable development of coastal communities and resources nationwide.

In addition, EPA and NOAA partner with coastal states to tackle nonpoint source pollution through the Coastal Nonpoint Pollution Control Program (CNP). CNP differs from EPA's Section 319 voluntary nonpoint source program in that it establishes a consistent set of economically achievable management measures backed by enforceable state policies for controlling polluted runoff. Measures are designed to prevent pollution from agriculture, forestry, urban areas, marinas, and hydromodifications (i.e., channel modification) and to ensure environmentally sensitive management of wetlands and riparian areas. In 2002–2003, the U.S. Virgin Islands (USVI), American Samoa, and the Commonwealth of the Northern Mariana Islands (CNMI) received full approval of their CNPs from NOAA and the EPA. Puerto Rico has already received this designation.

The U.S. Department of Agriculture (USDA) administers programs enabling many private landowners to receive technical and financial resources to apply conservation practices on their lands. The USDA's Natural Resources Conservation Service provides

<sup>5</sup> An "invasive species" is defined as an alien (non-native species) whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112).

technical assistance to landowners who want to voluntarily develop individual farm and ranch plans and implement conservation measures that affect millions of acres. These efforts help reduce soil erosion and nutrient runoff, thereby enhancing water quality. The U.S. Fish and Wildlife Service (USFWS) also has a number of programs providing funds and technical assistance for projects that address erosion and coastal wetland loss. These include the Coastal Program, Partners for Fish and Wildlife, and the Coastal Wetlands Grant program.

The USCRTF also addresses other sources of pollution of major concern. This includes pollutions from vessels and marine debris and the introduction and spread of invasive species. NOAA has led a major interagency effort in the NWHI to remove existing accumulations of marine debris, mostly derelict fishing gear from distant water fisheries.

## Highlights of Task Force Member Activities

**OBJECTIVE 1:** Reduce sedimentation and other land-based sources of pollution by implementing conservation management practices in coastal watersheds through public/private partnerships, incentive-based measures, regulatory measures, technical and financial assistance, habitat restoration, and other activities.

### Collaborative Assessment of Land-Based Source Pollution in War-in-the-Pacific National Park, Guam

In 2002, the National Park Service (NPS) initiated a unique project with the government of Guam and

## USDA/NRCS Programs Help Prevent Soil Loss

Sedimentation from land-based sources can impact coral reef ecosystems. Soil conservation efforts upstream can help reduce sediment transport from coastal watersheds to reef habitat.

In 2003, it is estimated that USDA/NRCS programs prevented:

52,417 dump truckloads of soil loss in the Caribbean.  
5,542 dump truckloads of soil loss in the Pacific region.  
12,816 dump truckloads of soil loss in Florida.

(Average dump truck volume is approximately 8 cubic yards.)

the University of Guam to assess the relationships among wildfires, upland erosion, and coral reef sedimentation in the War-in-the-Pacific National Historical Park and at other locations. Monitoring sites are yielding valuable information that will contribute to the development of best management practices to help resource managers address land-based threats to reef resources throughout Guam.

### Using Partnerships and the Hawaiian Ahupua'a Concept To Reduce Land-Based Pollution

In Hawai'i, state, local, and private stakeholders and USFWS, USDA, and EPA formed watershed partnerships to implement landscape-scale conservation while reducing siltation on adjacent coral reefs. The ancient Hawaiian concept of the Ahupua'a recognizes the connectedness of the environment, from the mountains to the sea, and the importance of meeting community needs while respecting the vitality of the land. An intact forest absorbs, stores, and slowly releases rainwater much more efficiently than an ecosystem damaged by invasive species. Controlling habitat-altering factors in Hawai'i (e.g., invasive species, wildfires) while planting native





Sedimentation during high rainy season damages the southern coral reef ecosystems of Guam.

trees and understory species has proven effective in reducing the amount of sediment reaching adjacent marine ecosystems. In addition, in cooperation with the state, NPS, and the local community, USFWS funded removal of invasive plants and restoration of native plant species on several highly eroded islets near Oahu, which helped prevent reefs from being smothered by mudslides originating on these islets.

### EPA Targeted Watershed Grants Program

In 2003, the Hanalei Heritage River Program received a \$700,000 grant from EPA's Targeted Watershed Grants program to reduce pollution and assess coral reef health in Hanalei, Kauai. The project funding will be used to upgrade antiquated cesspools, control sediment discharges from farms, reduce erosion in forests, monitor water quality, and assess changes in the structure and recruitment of reef ecosystems.

### USDA and Local Partners Reforest Guam Watersheds

The USDA Natural Resources Conservation Service partnered with the Guam Division of Forestry and

Soil Resources, landowners, community members, and local businesses to implement the Guam Urban Forestry Project, which reforests watersheds and improves water quality in the Tumon Bay Marine Preserve. The community participated in all stages of the reforestation efforts, including installing vegetative barriers, filter strips, and tree plantings in the villages of Tumon and Harmon.

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**OBJECTIVE 2:** Improve water quality by reducing nutrient discharges from wastewater treatment facilities, vessels, industrial sources, storm water, agricultural sources, and air deposition.

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### No-Discharge Zone in the Florida Keys National Marine Sanctuary

In 2002, EPA, acting on a recommendation by the Governor of Florida, the Monroe County Board of County Commissioners, and the Water Quality Protection Program Steering Committee, designated all state waters within the boundary of the Florida Keys National Marine Sanctuary (FKNMS) as a no-discharge zone for vessel sewage.

### EPA Management Guidelines for Wastewater

The EPA released new guidelines in 2003 to help local governments strengthen their management of septic systems and other small, privately owned, decentralized wastewater treatment systems. These new guidelines are complemented by the Voluntary (National) Guidelines for Management of Onsite and Clustered Wastewater Treatment Systems. The guidelines seek to improve the performance of decentralized wastewater treatment systems. This objective is especially important in coastal areas with severely degraded or nonexistent wastewater treatment facilities.

## Mobile Irrigation Labs in South Florida

To maximize the efficiency of irrigation water and nutrient usage in southern Florida, the USDA Natural Resources Conservation Service, in partnership with the South Florida Water Management District, Florida Department of Agriculture, and local soil and water conservation districts, is using mobile irrigation labs (MILs). These systems help reduce fertilizer and sediment losses that may affect coral reefs. In fiscal year 2002, in southern Florida alone, MILs resulted in an estimated savings of 3,478 million gallons of water.

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**OBJECTIVE 3:** Reduce chemical pollution (e.g., oil, toxins, hazardous materials) from land-based sources and vessel discharges.

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## Contaminated Sediment/Debris Removed in South Florida

USDA's South Florida Resource Conservation and Development Area entered into a cooperative agreement with the Federal Emergency Management Agency (FEMA), Florida Department of Community Affairs, and Miami-Dade County to remove contaminated sediment and other debris from a 2.25-mile section of the secondary canal system. Removing the sediment eliminated its potential deposition and adverse impacts on associated coral reef ecosystems.

## Uniform National Discharge Standards for Armed Forces Vessels

EPA and the U.S. Navy are working together to develop Uniform National Discharge standards to regulate discharges, other than sewage, which are incidental to the normal operation of Armed Forces vessels. Phase I of the rulemaking characterized the nature of the discharges (e.g., bilge water) and

determined which discharges will be subject to pollution-control measures. The Phase I rule identified 25 types of vessel discharges that would require control by a marine pollution control device (MPCD), and identified 14 vessel discharges that would not require pollution controls because of their low potential for causing adverse environmental impacts. Currently, the agencies are working on Phase II of the rule, which will establish 25 performance standards for MPCDs. Under this phase, EPA and the U.S. Navy are identifying and evaluating potential MPCDs for the 25 types of discharges in order to establish performance standards based on the environmental performance of feasible MPCDs. The agencies are promulgating discharge standards in "batches" and completed the Batch One technical analysis in August 2003. For more information, visit <http://www.epa.gov/waterscience/rules/UNDS/vessels.pdf>.

## Ship Grounding Removal

The removal of a number of grounded and abandoned vessels threatening coral reef resources in Guam, Hawai'i, American Samoa, Puerto Rico, and southern Florida has prevented further impacts on coral reefs resulting from loose debris or cyanobacteria (*Lyngya spp.*) blooms, which have been linked to an increased presence of iron, phosphate, and nitrate.

## U.S.S. *Mississinewa* Oil Removal

In 2002, the U.S. Navy offloaded nearly 2 million gallons of heavy fuel oil from the *U.S.S. Mississinewa*, a Navy oiler that sunk during WWII while anchored at Ulithi Atoll, Yap, in the Federated States of Micronesia. The Navy sent a salvage team to recover the fuel from the sunken vessel, eliminating the threat of oil releases that could have adversely affected the atoll environment and the health and safety of nearby residents.



Governor Felix P. Camacho during a Guam "Island Pride" coastal clean-up effort.

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**OBJECTIVE 4:** Reduce the flow of marine debris and remove existing marine debris from reef ecosystems.

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### Derelict Fishing Gear, Marine Debris Removal Efforts in Hawai'i

The NWHI have one of the most pristine coral reef ecosystems in U.S. waters. Derelict fishing gear from distant water fisheries is the greatest anthropogenic impact to the NWHI. NOAA, the State of Hawai'i, the U.S. Department of the Interior, the U.S. Coast Guard (USCG), and many local partners continue to coordinate the removal of derelict fishing gear from the NWHI. They removed approximately 107 tons in 2002, 122 tons in 2003. Overall, they have removed a total of approximately 336

tons since 1996. It is estimated that 25–40 tons per year will continue to impact the NWHI.

Since derelict fishing gear continues to accumulate in the NWHI, a number of activities have been instituted to assess ways to reduce derelict fishing gear and its impacts to this coral reef ecosystem. These activities include:

- NOAA studies to detect and remove derelict fishing gear from the open ocean;
- An Asian Pacific Economic Cooperation workshop, in coordination with the U.S. Department of State, on the problems of derelict fishing gear that highlighted constructive information exchange, knowledge building, technical assistance, and capacity building; and
- Initiation of an interagency international working group to develop a strategy to address derelict fishing gear.

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**OBJECTIVE 5:** Prevent and control the spread of invasive species (e.g., non-native species) in coral reef ecosystems from ballast water and other mechanisms.

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### Mandatory Ballast Water Management Program Established

USCG established a national mandatory ballast water management program requiring vessels entering the U.S. Exclusive Economic Zone intending to call at a U.S. port or place to manage their ballast water through such practices as mid-ocean exchange, retention of water onboard, and USCG-approved treatment methods. A follow-up regulation specifying the discharge standard to be met by ballast water treatment systems for use as an alternative to ballast water management practices is planned for late 2005. As part of this program, USCG is developing both an improved method



for verifying that ballast water was exchanged in mid-ocean and, in conjunction with the EPA, a process for testing and verifying the performance characteristics of technologies used to treat ballast water. The Armed Services Ballast Water Management Program also requires ballast water management practices for its vessels meeting the U.S. Department of Defense's policies and programs for ballast water exchange.

### Volunteer Efforts of Invasive Species Control

In Hawai'i, volunteers removed an estimated 68 tons of invasive algae from Waikiki and Kaneohe Bay reefs. Though not significantly effective at relieving the threat of aquatic invasive species (AIS) in Hawai'i, events like this help increase awareness of the impacts of AIS in Hawai'i.

### Hawai'i AIS Management Plan Approved

The Federal Aquatic Nuisance Species Task Force approved the State of Hawai'i Aquatic Invasive Species Management Plan in September 2003. The plan enhances the coordination of current management efforts, identifies remaining management gaps, and recommends additional actions needed to adequately address AIS. Such actions include minimizing the harmful ecological, economic, and human-health impacts of AIS through the prevention and management of their introduction, expansion, and dispersal into, within, and from Hawai'i.

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**OBJECTIVE 6:** Develop tools to assess and address the impacts of pollution on coral reefs.

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### Coral Condition Indicators

EPA's Office of Research and Development, in collaboration with the Florida Keys National Marine Sanctuary and Dry Tortugas National Park, is


assessing coral condition within different geographic zones of South Florida. Coral condition indicators include coral composition and abundance, prevalence of bleaching and disease, total coral surface area, percent living coral, and living coral surface area. The approach allows composition-independent comparisons across reefs and geographic zones, information that will be used to investigate potential anthropogenic or natural stresses in areas of decline. Because measurements are made on each colony in the transect, the indicators can be analyzed at the population level. Populations in decline will be examined in the laboratory for sensitivity to suspected stressors.

### Temporal Watershed Dynamics of the USVI and Puerto Rico Characterized With Geographic Information System

In 2002, NOAA began a project to characterize activities and changes in watersheds and to trace their potential impacts on shallow-water coral ecosystems in the USVI and Puerto Rico. The program will help managers understand the impacts of land use in coastal watersheds over time and identify and repair key watersheds that may most affect adjacent marine ecosystems. Other thematic data can be easily incorporated into the geographic information system to enhance the scope of the project.

### National Coastal Condition Report

During 2003, EPA and its partner agencies conducted policy and technical reviews of a draft of the second National Coastal Condition Report (NCCR II); the final report has been released (<http://www.epa.gov/owow/oceans/nccr/2005/index.html>). NCCR II provides comprehensive, comparable, and nationally consistent ratings of several key ecological health indicators: water quality, coastal habitat loss, sediment quality, benthic community condition, and fish tissue contaminants, many of which may relate to the health of



coral reef ecosystems. Unlike the first NCCR issued in 2001, this updated version includes coastal condition information for Puerto Rico. During 2003, EPA and its partners also collected and analyzed data for the 2006 NCCR, which will be expanded to include indicator data for Hawai'i. Trends analysis gleaned from the NCCR II and future assessments will be used to help determine the effectiveness of coastal and estuarine protection programs.

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**OBJECTIVE 7:** Increase awareness and understanding of the ecological health and socioeconomic impacts of land-based and marine pollution on reef ecosystems.

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For the highlights under this objective, please see chapter 4: Understanding Social and Economic Factors and chapter 10: Improving Outreach and Education.

## Future Challenges

Implementing voluntary and regulatory programs to address point and nonpoint pollution sources has helped improve water quality flowing into some coral reef areas; however, more work needs to be accomplished to reduce the sediment, nutrients, and other contaminants reaching coral reef ecosystems. To continue to address land-based sources of pollution, efforts need to address such activities as the following:

**Resolve water quality issues.** The U.S. state and territory islands have identified the need to update, repair, or expand current water treatment systems to accommodate increasing populations and avoid repeated incidents of sewage spills that can adversely impact coral reef and human health.

**Support LASs.** Federal agencies must continue to emphasize coral reef watersheds within their pollution-reduction programs and to implement LASs for land-based sources of pollution. At the local level, continued work is needed between states and territories and the local stakeholders to implement the actions contained in the LASs and adapt individual strategies to meet changing needs and objectives.

**Restore watersheds.** Federal agencies need to continue to implement land-based restoration programs to reduce nonpoint source pollution affecting coral reef ecosystems. One of the most critical improvements needed involves infrastructure related to sewage treatment and waste disposal.

**Inventory invasive species and identify pathways for introductions.** The introduction of non-native species to new areas has a devastating impact on native biota. In Hawai'i, invasive species are of particular concern to management agencies in areas where non-native algae have out-competed native corals and changed the structure of localized reef resources. To enhance knowledge about invasive species and their impact on coral reef ecosystems, inventories are needed of non-native species found in the Pacific Islands. Additionally, there is a need to identify pathways for invasive species introductions (e.g., hull fouling) in coral reef ecosystems in order to assist in prevention efforts.

**Develop a program to monitor land-based pollution.** Further work is needed to identify and measure the effectiveness of management activities to reduce the impacts of land-based pollution on the health of coral reef ecosystems. Specifically, effective and consistent monitoring programs are needed to establish baselines of coral reef health and to determine pollution status and trends.