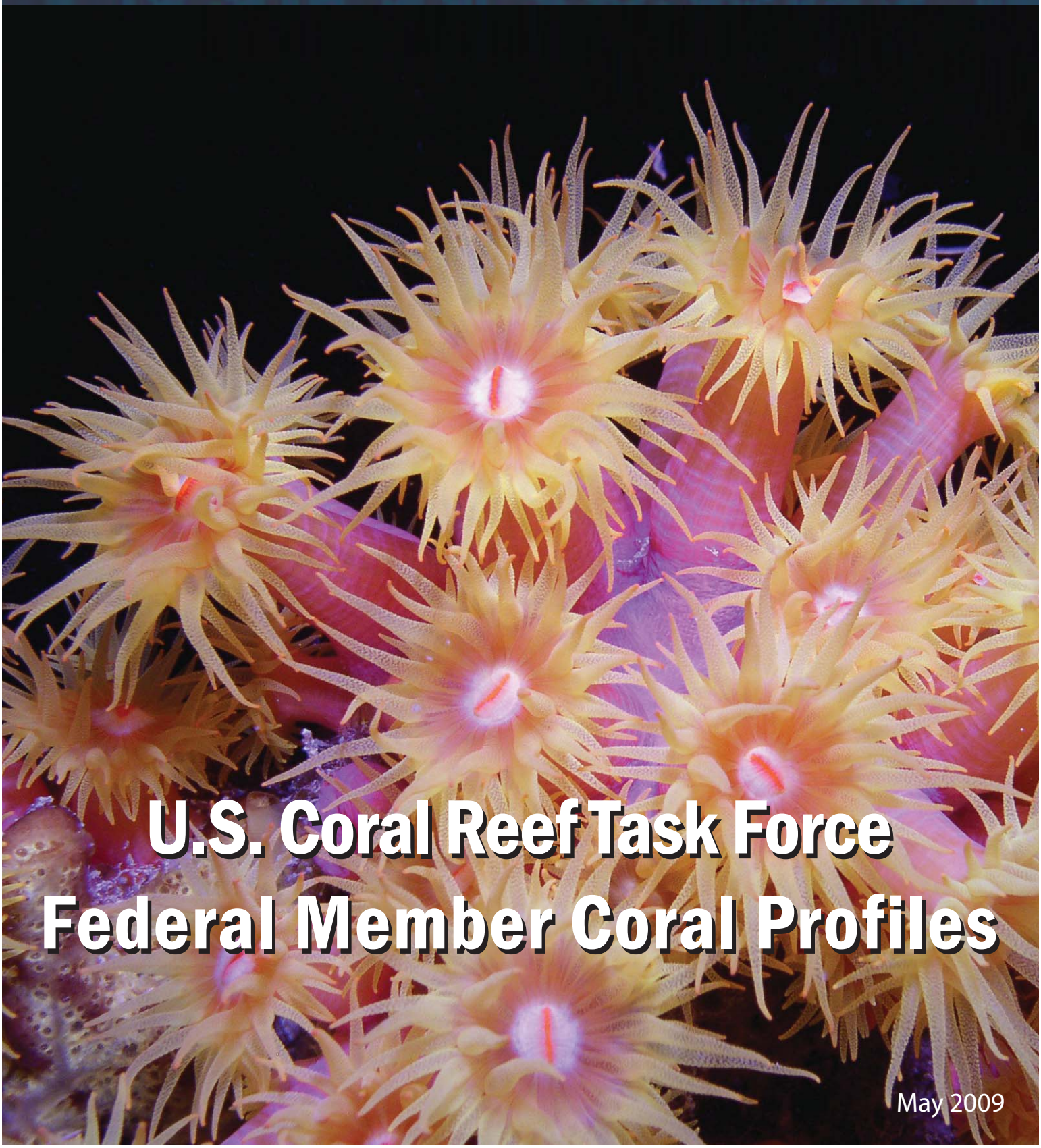
UNITED STATES
CORAL REEF TASK FORCE



U.S. Coral Reef Task Force Federal Member Coral Profiles

May 2009

About Coral Profiles

These Coral Profiles provide a concise overview of the United States Coral Reef Task Force (USCRTF) Federal members' mission, role, authorities, programs, activities, and resources (grants, tools, training, etc) related to coral reefs and associated ecosystems. The intent of the Coral Profiles is to better capture each Federal member's role in coral reef conservation and to facilitate better planning and collaborative action among and between USCRTF members, including jurisdictions, and help the USCRTF better direct its collective activities. The Coral Profiles present and introduce individual Federal agencies to the general public, and highlight funding opportunities available to jurisdictions and NGOs. The Coral Profiles also contain many coral reef highlights from each agency. Below is a sample from each one:

- **NOAA CRCP:** The Coral Reef Conservation Program has a large grant program funding major coral reef research and management initiatives in the US and abroad.
- **FWS:** Fish and Wildlife Service manages 15 coral reef National Wildlife Refuges and 4 National Marine Monuments which represent the largest and most ecologically comprehensive series of fully-protected marine areas under unified conservation management in the world.
- **MMS:** Since the 1970s, the Mineral Management Service has sponsored long-term monitoring in the coral reef ecosystem of the Flower Garden Banks located in the Gulf of Mexico.
- **NPS:** The National Park Service has 10 National Parks in the Pacific, Florida and the Caribbean with coral reef ecosystems.
- **OIA:** Office of Insular Affairs, through its Coral Reef Initiative, funds coral reef conservation and management projects in the US insular areas.
- **USGS:** The U.S. Geological Survey developed a "Strategic Science for Coral Ecosystems 2007-2011," a comprehensive planning document encompassing marine reserves and reef structure, pollution and local impacts, and responses to global change.
- **USAID:** The US Agency for International Development provides core support to the WorldFish Center, which published a "Lessons Learned and Best Practices in the Management of Coral Reefs," providing a comprehensive analysis of 30 projects worldwide.
- **USCG:** The US Coast Guard provides assets to assist with the removal of fishing gear and other debris affecting coral reefs; removing over 510 metric tons from Hawai`i since 1996.
- **USDA:** The Department of Agriculture staff produces and maintains Field Office Technical Guides, with information on conservation, water, air and biological resources, as well as maps, cultural resources, and protected species.
- **DOD - Navy:** The Department of Defense funds a vast array of environmental research via the Strategic Environmental Research and Development Program, focusing the areas of cleanup, compliance, conservation and pollution prevention technologies.
- **USACE:** The Army Corps of Engineers maintains an Institute for Water Resources, offering education and training opportunities in water resource management.
- **DOS:** The Department of State provides substantial support to the International Coral Reef Initiative and the Coral Triangle Initiative.
- **EPA:** The Environmental Protection Agency maintains the Catalog of Federal Funding Sources for Watershed Protection, a database with funding from many Federal agencies.
- **NASA:** The National Aeronautics and Space Administration conducts cutting-edge coral monitoring and imaging research, including the Millennium Coral Reef Mapping Project, which maps all reefs found in all tropical oceans.
- **NSF:** The National Science Foundation supports projects targeted to advancing knowledge of coral reef ecosystems, including long-term and inter-disciplinary research.

Agency Contributors

This document was produced with the assistance and collaboration of the members and staff of the U.S. Coral Reef Task Force (USCRTF). This report involved collecting, assessing, and presenting information on coral reef activities from the Federal members of the USCRTF. We thank all of the individuals who committed their time to drafting this report.

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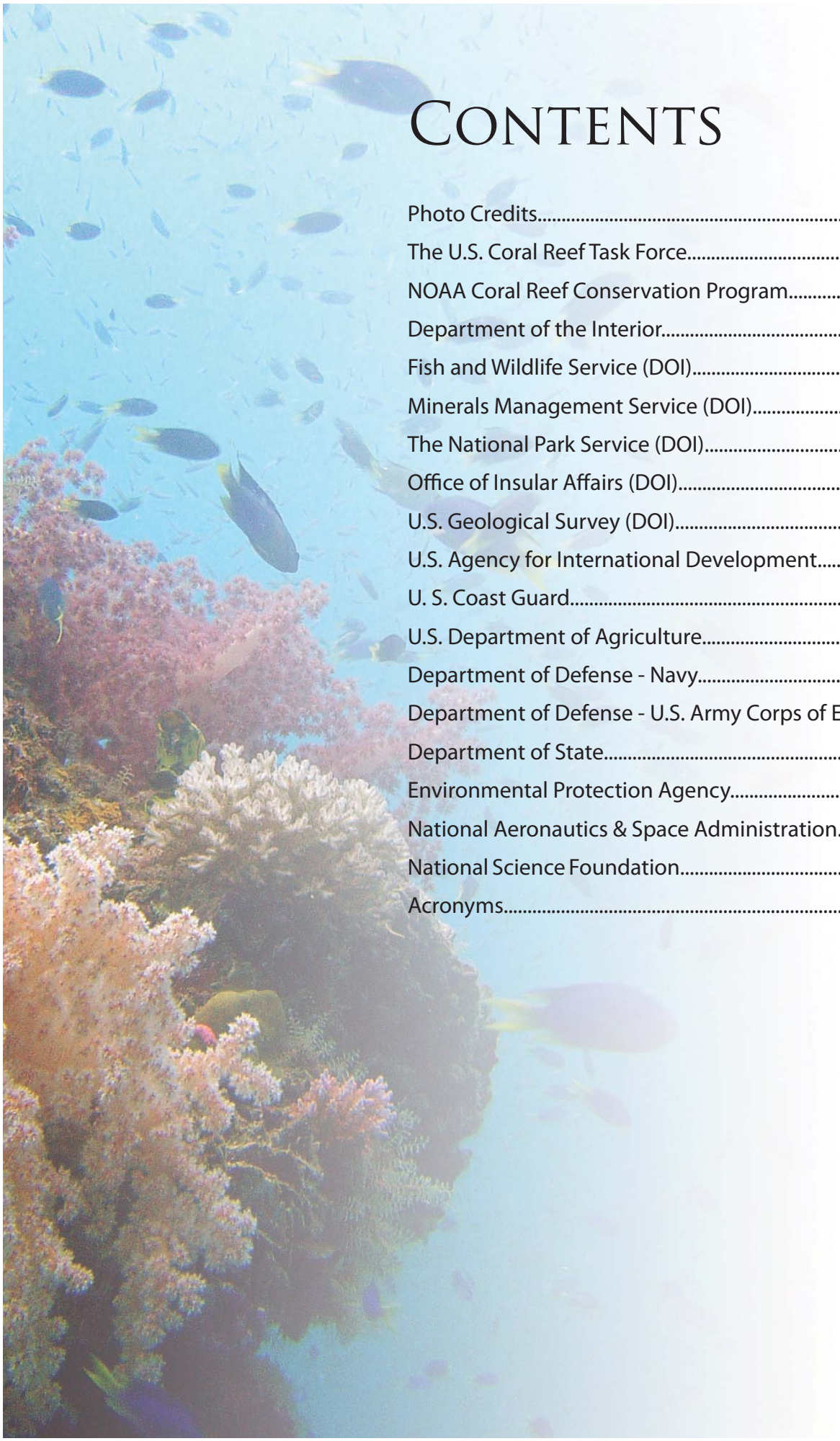

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Photo Credits

Cover Photo - Corals of the Dendrophylliidae family, Turbinaria genus, on the Tokai Maru, in Apra Harbor, Guam (David Burdick).

Page 4 & 5 - Coral reef in Chuuk, Federated States of Micronesia (David Burdick).
Page 6 - A shrimp (Rhynchocinetes sp.) on a colony of star coral, Montastrea faveolata, at East Bank, Flower Garden Banks National Marine Sanctuary (David Burdick).

Other photographs in this report were provided by respective agency staff.

The U.S. Coral Reef Task Force

The United States Coral Reef Task Force (USCRTF) was established in 1998 by Presidential Executive Order 13089 to lead U.S. efforts to preserve and protect coral reef ecosystems. Co-chaired by the Department of the Interior and the Department of Commerce though the National Oceanic and Atmospheric Administration, the USCRTF includes leaders of 12 Federal agencies, seven U.S. states, territories, commonwealths, and three Freely Associated States. The USCRTF helps build partnerships, strategies, and support for on-the-ground action to conserve coral reefs.

Presidential Executive Order "*13089: Coral Reef Protection*" was issued to enhance the role of Federal agencies in the preservation and restoration of coral reef ecosystems. The Executive Order establishes a policy framework to guide Federal action and its impacts on coral reefs, and mandates that:

> (1) The Federal agencies utilize their programs and authorities to protect and enhance the conditions of U.S. coral reef ecosystems, and
> (2) To the extent permitted by law, ensure that any actions they authorize, fund or carry out will not degrade the conditions of such ecosystems.

The USCRTF is responsible for overseeing implementation of the Executive Order, and developing and implementing coordinated efforts to map and monitor U.S. coral reefs; research the causes of, and solutions to coral reef decline; reduce and mitigate coral reef degradation from pollution, over-fishing and other causes; and implement strategies to promote conservation and sustainable use of coral reefs internationally.

In 2000, the USCRTF adopted the *National Action Plan to Conserve Coral Reefs* (National Action Plan), the first national blueprint for U.S. domestic and international action to address the growing coral reef crisis. The National Action Plan outlines 13 integrated conservation strategies within two fundamental themes to address the most pressing challenges facing reefs today. To help implement the National Action Plan, the USCRTF launched a variety of initiatives and provides a forum to support collaborative action of its members and partner organizations. In 2002, the USCRTF developed the *U.S. Coral Reef National Action Strategy* (National Action Strategy) to further implement the National Action Plan as called for in the Coral Reef Conservation Act of 2000 (CRCA) (16 U.S.C. ß6401 et seq.). These documents provide the guiding framework for the priorities, strategies, and actions of the USCRTF and its members.

USCRTF Members

The USCRTF membership, as established in 1998, included members of 11 Federal agencies, which has since grown to include 12 Federal agencies, 7 U.S. states, territories, commonwealths, and 3 Freely Associated States.

Recognizing that coral reef ecosystems are largely in state and territorial waters, one of the first actions the USCRTF took in 1999 was to invite the Governors of American Samoa, the Commonwealth of the Northern Mariana Islands, Florida, Guam, Hawaii, Puerto Rico, and the U.S. Virgin Islands to join the USCRTF as full members and partners.

In 2000, the Presidents of the Freely Associated States of the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau were invited to participate in the USCRTF as non voting members.

Co-Chairs:

Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA)
Department of the Interior (DOI)

Federal Agency Members

U.S. Agency for International Development (USAID)
U.S. Department of Agriculture (USDA)
Department of Defense (DOD)
U.S. Department of Homeland Security, Coast Guard
Department of Justice (DOJ)
Department of State (DOS)
Department of Transportation (DOT)
Environmental Protection Agency (EPA)
National Aeronautic and Space Administration (NASA)
National Science Foundation (NSF)

State and Territories Members

Commonwealth of the Northern Mariana Islands
Commonwealth of Puerto Rico
State of Florida
State of Hawaii
Territory of Guam
Territory of American Samoa
Territory of the U.S. Virgin Islands

Freely Associated States

Federated States of Micronesia
Republic of the Marshall Islands
Republic of Palau

USCRTF Renewed Call to Action

At the 2008 USCRTF meeting in Kona, Hawaii, the USCRTF celebrated its 10-year anniversary and issued a renewed call to action to conserve and protect coral reefs, noting the severity of the threats facing coral reefs and the immediate need to take action:

It is clear that the USCRTF, with partners, must significantly increase our collective effort to address the factors over which we can exercise control. The USCRTF must take immediate action to respond to these threats and, in turn, seek to sustain our coral reef ecosystems and the communities that depend upon them….

Science has demonstrated that reef communities can recover when they are protected and stressors are removed. Urgent action is needed to reduce greenhouse gas emissions. In the meantime, precious time for coral reef ecosystems can be secured through increased protection from land and marine pollution, unsustainable fishing, development, and other stressors, all of which we know can damage coral health. The time to act is now.

Decision Items

The USCRTF works by consensus with all individuals providing input and expertise. USCRTF members address new topics and issues that are priority concerns for the long-term health and sustainability of coral reef ecosystems and the communities that depend on them. One mechanism by which this is accomplished is through the passage of resolutions. Resolutions define the issue or problem and then set out a plan of action. Any USCRTF or Steering Committee member can present resolutions for the USCRTF to consider at its biannual meetings. In the fall of 2008, the Steering Committee adopted new "Guidelines for preparing proposals for consideration by the USCRTF" that are intended to clarify the proposal and decision-making process and promote more efficient, effective and accountable action. For more information please visit www.coralreef.gov/resolutions.

USCRTF Steering Committee

The Steering Committee is comprised of one lead Point of Contact (POC) from each USCRTF member agency, state and territory, and the chairs of the working groups. Additional staff representatives participate as appropriate or as needed. For example, each of the participating DOI bureaus on the USCRTF has a staff representative, and additional regional staff participates from several of the Federal agency members. The Steering Committee is co-chaired by representatives of the Departments of Commerce and the Interior.

The Steering Committee serves as the primary work force for the USCRTF and oversees fulfillment of USCRTF action. The Steering Committee works closely with the USCRTF working groups and agency staff to fulfill a variety of duties as assigned by the USCRTF. The Steering Committee meets twice a year in person, monthly by conference call, and has a listerv that circulates information to members at any time.

Working Groups

One way in which the USCRTF works to accomplish its mission and implement projects and activities is through the coordination of smaller, issue specific working groups.

The following working groups were established to develop the *National Action Plan to Conserve Coral Reefs*, the first national blueprint for U.S. domestic and international action to address the growing coral reef crisis. These working groups compiled the state of knowledge and developed plans to support collaborative actions of their members and partner organizations. While no longer active, the working groups remain fully engaged in USCRTF activities.

- Mapping and Information Working Group
- Coastal Uses Working Group
- Air and Water Quality Working Group
- Ecosystem Science and Conservation Working Group
- International Working Group

The following working groups were established in response to a USCRTF Resolution, action item, or identified need of its members and partners:

- Coral Disease and Health Consortium (active)
- Education and Outreach Working Group (active)
- Coral Spawning Working Group (active in the Pacific region)

- Water Quality Working Group (active)
- Mitigation Working Group (active in the Pacific region)
- Aquaculture Working Group
- Injury Response Tools Working Group (active)
- Climate Change Working Group (active)

USCRTF Resources

Implementation of the National Coral Reef Action Strategy Report to Congress
This document is the second report on implementation of the *National Action Strategy* submitted to Congress as required by the Coral Reef Conservation Act. The report highlights USCRTF activities and accomplishments from 2004 to 2006 with particular emphasis on collaborative efforts among USCRTF members and partner organizations. The report addresses each goal from the *National Action Plan* and *National Action Strategy* and charts annual funding by Federal agencies for activities directly related to the *National Action Strategy*.
http://www.coris.noaa.gov/activities/reportcongress2008/

Governor Tauese P.F. Sunia Memorial Coral Reef Conservation Summer Scholarships

Since 2004, the Department of Interior's Office of Insular Affairs, U.S. Fish and Wildlife Service and NOAA have hosted Sunia Scholars from the Pacific and Caribbean areas. This internship is available for students from Guam; the Commonwealth of the Northern Mariana Islands; Hawai‘i; American Samoa; Puerto Rico; the U.S. Virgin Islands; the Freely Associated States of Palau, the Marshall Islands, and the Federated States of Micronesia.

This award is intended to continue the Governor’s legacy by providing an outstanding college or university student the opportunity to develop professional coral reef management skills to be applied in his or her local jurisdiction. This scholarship provides students a unique opportunity to gain valuable, professionally formative experience in coral reef conservation policy and management while also contributing to the overall efforts of the hosting agency and the USCRTF. For additional information, contact coralreefweb@noaa.gov.

NOAA Coral Reef Conservation Program

The National Oceanic and Atmospheric Administration (NOAA) Coral Reef Conservation Program (CRCP) is a national, science-based organization that supports effective management and sound science to protect, sustain and restore coral reef ecosystems. It was established in 2000 to help fulfill NOAA's responsibilities to preserve, protect and restore coral reefs from the Coral Reef Conservation Act (CRCA), Presidential Executive Order 13089 on Coral Reef Protection and other mandates.

Since 2000, the CRCP has been responsible for program planning, execution and evaluation including management of annual appropriations, which amount to about $27 million. To address these mandates, the CRCP has invested in the application of a range of tools and activities by NOAA and other organizations to 1) increase our understanding of coral reef ecosystems, 2) reduce reef threats, and 3) increase management effectiveness at local, state/territory, regional, national and international levels.

National Coral Reef Action Strategy

CRCP, as mandated by the Coral Reef Conservation Act, led the development and publication of the National Strategy in cooperation with the USCRTF. The National Strategy was designed as an implementation plan for the U.S. National Action Plan to Conserve Coral Reefs that was adopted by the USCRTF in 2000 as a comprehensive blueprint for U.S. action to conserve coral reefs. Activities by the CRCP include:

> (1) mapping, monitoring, assessment, restoration, and scientific research that benefit the understanding, sustainable use, and long-term conservation of coral reefs and coral reef ecosystems;
> (2) enhancing public awareness, education, understanding, and appreciation of coral reefs and coral reef ecosystems;
> (3) providing assistance to States in removing abandoned fishing gear, marine debris, and abandoned vessels from coral reefs to conserve living marine resources; and
> (4) cooperative conservation and management of coral reefs and coral reef ecosystems with local, regional, or international programs and partners.

Authorities and Mandates

There are three primary mandates that guide implementation of the CRCP: (1) the Coral Reef Conservation Act of 2000 (CRCA)(16 U.S.C. 6401 et seq. December 2000), (2) Executive Order 13089 on Coral Reef Protection (1998), and 3) the Magnuson-Stevens Fisheries Conservation and Restoration Act. The mandates and requirements for each of these are described below, as well as other drivers. NOAA has a variety of other mandates for science and/or management action related to coral reef ecosystems including: Protected species management (Endangered Species Act, Marine Mammal Protection Act) Coastal Zone management (Coastal Zone Management Act) National Marine Sanctuaries management (National Marine Sanctuaries Act). A summary of three primary mandates is offered below.

Coral Reef Conservation Act (CRCA)

The CRCA of 2000 authorized the Secretary of Commerce to publish a National Coral Reef Action Strategy (National Strategy) and establish a national program, grants program and conservation fund to fulfill the following purposes:

(1) to preserve, sustain, and restore the condition of coral reef ecosystems;
(2) to promote the wise management and sustainable use of coral reef ecosystems to benefit local communities and the Nation;
(3) to develop sound scientific information on the condition of coral reef ecosystems and the threats to such ecosystems;
(4) to assist in the preservation of coral reefs by supporting conservation programs, including projects that involve affected local communities and nongovernmental organizations;
(5) to provide financial resources for those programs and projects; and
(6) to establish a formal mechanism for collecting and allocating monetary donations from the private sector to be used for coral reef conservation projects.

Reauthorization of the CRCA - During 2004-2008, the CRCP has assessed issues and needs to possibly address in reauthorization of the CRCA. As a result, the Bush Administration submitted a proposal to reauthorize the CRCA in May 2007 that included significant changes and new authorities to strengthen NOAA's abilities to preserve, protect and restore coral reef ecosystems. Among the key amendments found in the CRCA reauthorization were:
- Agreements and Partnership: Facilitate existing and new partnerships with other agencies, governments and organizations to help protect and restore coral reef ecosystems, including increased collaboration with international partners.
- Programmatic Expansion: Broaden the scope of NOAA's programmatic authority to better allow the agency to address ongoing and emerging threats to coral reefs such as coral disease and bleaching, and to provide support for related management challenges.
- DOI Authority: Enhance DOI's ability to provide technical assistance to states and territories to carry out their research and management objectives by amending several existing general authorities to specify that they apply to coral reefs and provides express authority for grants and technical assistance to the territories.
- Emergency Response: Authorizes NOAA to provide assistance to local government agencies during disaster-related events that impact coral reef ecosystems. It also mandates for the allocation of funds for emergency response and restoration.
- Liability: Those who damage coral reef ecosystem are liable for the cost of response.
- Enforcement: Allows for using civil administrative and judicial penalties, and for the denial or revocation of permits issued, as well as criminal and civic forfeiture.

Magnuson Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in United States Federal waters. The Act was first enacted in 1976 and amended in 1996. Most notably, the Magnuson-Stevens Act aided in the development of the domestic fishing industry by phasing out foreign fishing. To manage the fisheries and promote conservation, the Act created eight regional fishery management councils. The 1996 amendments focused on rebuilding overfished fisheries, protecting essential fish habitat, and reducing bycatch.

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, (MSRA), mandates the use of annual catch limits and accountability to end overfishing, and calls for increased international cooperation. Additionally, MSRA provides NOAA science and management authorities related to deep-sea coral communities. The MSRA directs the Secretary of Commerce, in consultation with appropriate Regional Fishery Management Councils, and in coordination with other Federal agencies and educational institutions, to establish a Deep-Sea Coral Research and Technology Program. MSRA also authorizes the councils to designate zones to protect deep-sea corals from damage caused by fishing gear.

CRCP Roadmap

In 2008, in response to an external review of the program, the CRCP produced a "Roadmap for the Future," listing activities and objectives for the program through 2015. The Roadmap outlines seven principles to help guide decision-making regarding the program's activities and funding:

1. Addressing coral reef management needs based on sound science
2. Using an ecosystem-level approach to coral reef conservation, including human aspects
3. Forming strong partnerships to implement the mission of the CRCP
4. Leveraging of non-CRCP resources will be instrumental in achieving program objectives
5. Adopting measurable objectives will be included and tracked for all CRCP-funded activities
6. Implementing clear and transparent decision-making processes, including those involving spend plans
7. Focusing Program funding to reflect CRCP priorities

To more effectively target resources available, the CRCP has shifted focus to emphasize efforts on understanding and addressing the top three global threats to coral reef ecosystems:
- Fishing impacts
- Land-based sources of pollution
- Climate change

The Program is also expanding its international presence by becoming more actively involved in coral conservation efforts in the Pacific, the Coral Triangle, and the Caribbean.

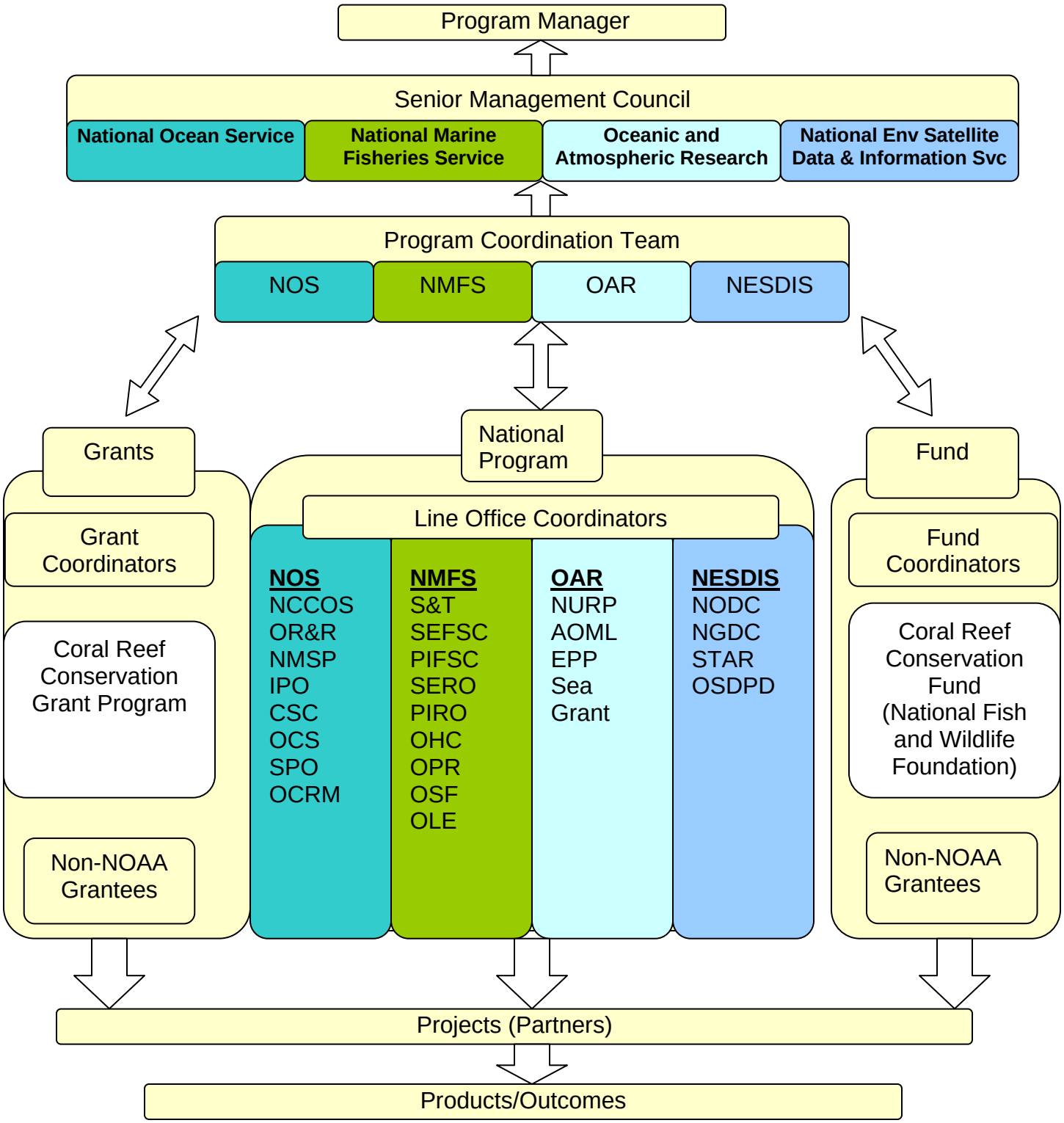
Programs & Projects

National Program

The National Program provides resources, tools and services to coral reef managers, scientists and communities via NOAA offices to address the goals of the Coral Reef National Action Strategy. While collaboration with non-NOAA entities on implementation of activities funded by the CRCP's National Program is highly encouraged, all funds for these activities are managed by NOAA Offices. The National Program also includes the Secretariat of the USCRTF.

Organizational structure

The CRCP is a cross-NOAA, matrix-structured organization that involves participants from four of NOAA's Line Offices. This unique structure has allowed the CRCP to utilize partners, expertise and capacity of 25 offices across multiple levels of the NOAA Line Office organization.



Coral Reef Conservation Grants Program

The Coral Reef Conservation Act of 2000 established the Coral Reef Conservation Grant Program, through which the CRCP makes available matching grants or cooperative agreements to government agencies, non-government organizations and academic institutions for coral reef conservation activities consistent with the purposes of the Act. CRCP annual appropriations are distributed through the Grants Program. Funds are awarded under the following six categories:

- State and Territory Coral Reef Ecosystem Management
- State and Territory Coral Reef Ecosystem and Monitoring
- Coral Reef Ecosystem Research
- Projects to Improve or Amend Coral Reef Fishery Management Plans
- General Coral Reef Conservation
- International Coral Reef Conservation

Coral Reef Conservation Fund

This Fund is administered by the National Fish and Wildlife Foundation (NFWF) to help build public-private partnerships to reduce and prevent degradation of coral reefs and associated reef habitats (e.g. seagrass beds, mangroves, etc.). The Fund received approximately $900,000 from the CRCP in Fiscal Year 2008 and leveraged over $2 million in non-Federal resources.

Coral Reef Research Institutes

CRCP includes three Coral Reef Research Institutes: the Caribbean Coral Reef Institute, the Hawai`i Coral Reef Initiative Research Program, and the National Coral Reef Institute. These are congressionally-directed programs, administered and managed by NOAA’s Center for Sponsored Coastal Ocean Research (CSCOR). Although these Institutes are associated with the CRCP, their funding comes separately from the Program’s appropriations. CRCP conducts collaborative consultation on an annual basis to help advice priority- and direction- setting for these key partners.

Resources Available

Tools & Data

Coral Reef Watch

The mission of NOAA's Coral Reef Watch Program is to utilize remote sensing and in-situ tools for near real-time and long term monitoring, modeling and reporting of physical environmental conditions of coral reef ecosystems. Coral Reef Watch aims to assist in the management, study and assessment of impacts of environmental change on coral reef ecosystems. With the capability of providing synoptic views of the global oceans in near-real-time and the ability to monitor remote reef areas previously known only to wildlife, satellite remote sensing has become a key tool for coral reef managers and scientists. As early as 1997, NOAA's NESDIS began producing near-real-time, Web-accessible, satellite-derived Sea Surface Temperature (SST) products to monitor conditions conducive to coral bleaching from thermal stress around the globe. Recently, most of its key products, including SST anomalies, bleaching HotSpot anomalies, Degree Heating Weeks, and Tropical Ocean Coral Bleaching Indices have become "operational" products after successfully providing early warnings of coral bleaching to the global coral reef community as "experimental" products for several years. For more information and to access these products go to: http://coralreefwatch.noaa.gov/satellite/index.html

Coral Reef Information System (CoRIS)

Acting on recommendations of the USCRTF, in 2002, NOAA created the Coral Reef Information System (CoRIS) to allow the public to access to an array of diverse scientific data on coral reef ecosystems and new information products. CoRIS is a web-based information system that functions as a portal to products from coral reef research and management activities funded by and/or conducted in partnership with NOAA. Activities include coral reef mapping, monitoring, and assessment; natural and socioeconomic research and modeling; outreach and education; and management and stewardship. CoRIS functions as an archive through the NOAA National Oceanographic Data Center (NODC) to preserve coral reef data and project metadata, while offering a variety of search tools to assist users in the discovery of this information. http://www.coris.noaa.gov/

Training/Workshops

Bleaching Tools Workshop for Managers – a four-day hands-on workshop to assist mangers help build coral reef resiliency.
Coral Reef Manager Social Capacity Building – training designed to help managers systematically evaluate and monitor reef-society connections.

Funding Opportunities

Coral Reef Ecosystems Studies (CRES)

CRES is sponsored by NOAA, and solicits proposals for projects addressing the causes of regional declines in coral abundance and degradation of coral ecosystems. The intent of this program is to provide timely and high-quality scientific results for use in developing alternative management strategies to restore and protect coral reef ecosystems. http://ccmaserver.nos.noaa.gov/ecosystems/coralreef/cres.html

Both Coral Reef Conservation Grants Program and Coral Reef Conservation Fund (described earlier) also provide mechanisms to fund coral reef-related work.

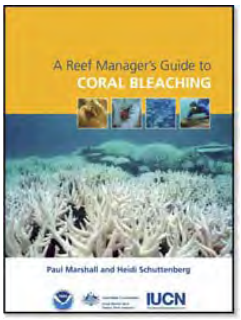
Fellowships Offered

NOAA Coral Reef Management Fellow Program

The Coral Reef Management Fellowship was established to respond to a need for additional coral reef management capacity and capability in the U.S. Flag Pacific and Caribbean Islands. The fellowship program provides highly qualified recent graduates with professional, on-the-job education and training on island-level coral reef management and has provided policy and management support to the U.S. jurisdictions for coral reef issues. Fellows are placed every other year for two years in each of the U.S. state and territory insular areas to work on specific projects and activities determined by each island's lead coral reef management agency. http://www.coralreef.noaa.gov/fellowship.html

Coral Publications, Products and Documents

The CRCP has supported a wide range of activities that produced many important products and services. Some recent highlights include:



A Reef Manager's Guide to Coral Bleaching: The Reef Manager's Guide provides information on the causes and consequences of coral bleaching, and management strategies to help local and regional reef managers reduce this threat to coral reef ecosystems. Produced by the National Oceanic and Atmospheric Administration (NOAA), the Australian Great Barrier Reef Marine Park Authority (GBRMPA), and the International Union for the Conservation of Nature (IUCN), the Reef Manager's Guide includes contributions from over 50 experts in coral bleaching and coral reef management from 30 organizations.
http://www.coris.noaa.gov/activities/reef_managers_guide/

Coral Reef Educational Resources: This compilation of resources includes lesson plans for grades 3-12, student activities, teachers' guides, videos, posters and brochures and was created by the USCRTF. It can be accessed online or by ordering a free CD. Topics covered include coral reef biology and ecology as well as ideas on how to engage and involve children in the conservation of these precious natural resources.
http://www.coralreef.noaa.gov/outreach/resourcecd08/welcome.html

The State of the Reef Ecosystems of the United States and Pacific Freely Associated States: 2008: A comprehensive assessment of all coral reef ecosystems in US states, jurisdictions and Freely Associated States. This report to Congress contains maps, a national summary, threats and conservation efforts. The 569-page report was structured to provide information according to the primary threats, topics, and goals outlined in the National Coral Reef Action Strategy.
http://ccmaserver.nos.noaa.gov/ecosystems/coralreef/coral2008/welcome.html

Corals from Outer to Inner Space

The Environmental Visualization Laboratory has produced a new Science on a Sphere exhibit to supplement NOAA's outreach efforts surrounding the International Year of the Reef. Science on a Sphere ® is a room-sized, global display system that uses computers and video projectors to display planetary data onto a six foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. The 8 minute long, fully narrated piece includes information on coral reef ecology, satellite monitoring of reefs, reef stressors, and actions being taken to improve reef health. http://www.nnvl.noaa.gov/education/animations/Coral_SOS.wmv

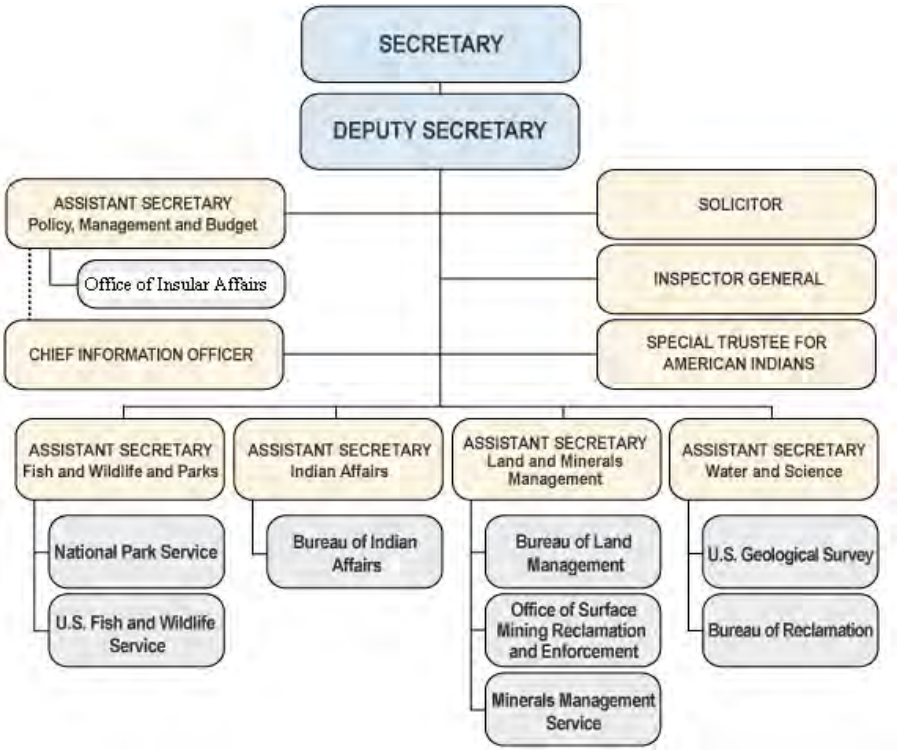
Department of the Interior

The mission of the Department of the Interior (DOI) is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

As the Nation's principal conservation agency, DOI protects coral reefs, tropical islands, and adjacent submerged ecosystems stretching halfway across the globe. DOI's holdings include some of the healthiest and most endangered coral reefs in the world. DOI also conducts pioneering research on coral reefs and supports management and protection of coral reefs in U.S-affiliated islands. To access a brief description of DOI's coral stewardship online, please view the DOI coral brochure at http://www.doi.gov/initiatives/ocean.html.

Organizational Structure

DOI is a large, decentralized agency with over 67,000 employees and 236,000 volunteers located at approximately 2,400 operating locations across the United States, Puerto Rico, U.S. territories, and freely associated states.



DOI's coral responsibilities are carried out by: **The U.S. Fish and Wildlife Service, the Minerals Management Service, the U.S. Geological Survey, the National Park Service, and the Office of Insular Affairs.** For more information about each specific roles and contributions to DOI's overall coral responsibilities, please read their individual coral profiles.

Fish and Wildlife Service (DOI)

The U.S. Fish and Wildlife Service (FWS) is the primary government agency dedicated to the conservation, protection, and enhancement of fish, wildlife and plants, and their habitats. It is the only agency in the Federal government whose primary responsibility is management of these important natural resources for the American public. The FWS fulfills these and other statutory responsibilities through a diverse array of programs, activities, and offices that function to:

- Protect and recover threatened and endangered species
- Monitor and manage migratory birds
- Restore nationally significant fisheries
- Enforce Federal wildlife laws and regulate international wildlife trade
- Conserve and restore wildlife habitat such as wetlands
- Help foreign governments conserve wildlife through international conservation efforts
- Distribute funds to States, territories and tribes for fish and wildlife conservation projects
- Manage National Wildlife Refuges guided by a “wildlife first” mandate of the National Wildlife Refuge Administration Act of 1966

The FWS coral reef responsibilities include managing the resources through habitat and species conservation, restoration, and recovery; supporting sound management through inventory and monitoring, and management-directed research; facilitating compatible public use, promoting environmental education, and ensuring enforcement. The management goals and on-the-ground needs include conservation of marine and terrestrial habitats and species, restoring degraded habitats, recovering imperiled species, marine debris removal, grounded and abandoned vessel removal, invasive and alien species prevention and eradication, management of public use (including fishing), enhancing opportunities to connect children and other public with nature, educating and interpreting the environment, and responding to affects of climate change.

The FWS manages the 147 million acre National Wildlife Refuge System (NWRS), the nation’s preeminent system of public lands and waters devoted to protection and conservation of fish and wildlife and their habitats. The NWRS includes 552 refuges that receive over 40 million visitors each year who participate in hunting, fishing, wildlife observation and photography, environmental education and interpretation, and other outdoor recreation activities. The FWS’s Migratory Bird program oversees conservation of over 400 bird species through national programs and international treaties. Many of the nation’s migratory seabirds, wading birds, and shorebirds are inextricably dependent upon coral reef ecosystems for feeding, nesting, and resting.

Authorities, Mandates and International Agreements

The FWS is responsible for implementing and enforcing some of our Nation’s most important environmental laws, such as the Endangered Species Act, Migratory Bird Treaty Act, Clean Water Act, Fish and Wildlife Coordination Act, and Marine Mammal Protection Act. The NWRS “wildlife first” mandate is supported mainly through the National Wildlife Refuge

System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997. The FWS mandate to protect coral reefs was strengthened by Executive Order 13089, “Coral Reef Protection” and Executive Order 13158, “Marine Protected Areas” and Executive Order 13366, “Committee on Ocean Policy.” The FWS shares responsibility with other government entities for the administration of many of these laws that require an ecosystem approach to wildlife conservation.

CITES Enforcement

The FWS has a 30-year history of implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The international trade in corals has contributed to the decline in coral reef ecosystems. Among the approximately 35,000 species protected by CITES, roughly 224 are associated with coral reef ecosystems including fish, invertebrates, and a number of species of stony corals. The FWS has a system of 38 ports to enforce CITES and monitor the import and export of wildlife, including parts and products. Generally all wildlife imported into or exported from the U.S. for any purpose must be declared to the FWS and cleared prior to release by U.S. Customs and Border Protection or prior to consignment for export. These efforts have been instrumental at defending against over-exploitation of coral reef resources both within the U.S. and abroad.

Organizational Structure

The FWS is a bureau within the DOI and is headed by a Director and two Deputy Directors. The FWS employees 8,704 full-time employees and hosts thousands of volunteers located at facilities across the country. The Service utilizes a diverse and largely decentralized organization to meet its conservation and management responsibilities. The FWS is organized nationally into 9 regional offices, including the Washington, D.C. Headquarters office located in Arlington, Virginia, and nearly 700 field offices.

Marine National Monuments

The FWS co-manages with NOAA and the State of Hawai`i, the Papahānaumokuākea Marine National Monument (MNM). In 2006, President Bush issued Presidential Proclamation 8031 designating this 1,200 mile stretch of the Northwest Hawaiian Islands as a National Monument. The 89 million acre monument includes the Midway Atoll NWR and the 100 year-old Hawaiian Islands NWR which the FWS continues to manage as refuges. In 2008, after extensive public input, the co-managers released a draft of the Monument Management Plan.

In January 2009, President Bush created three additional Marine National Monuments in the Pacific via Presidential Proclamations 8335, 8336, and 8337. The President assigned management responsibilities of the monuments to the Secretary of the Interior, in consultation with the Secretary of Commerce. On January 16, 2009, Secretary of the Interior Kempthorne issued Secretarial Order 3284 delegating his responsibilities to the FWS.

The Pacific Remote Islands MNM (PRIMNM) includes the lands and surrounding submerged areas out to 50 nm of six existing NWRs (Kingman Reef, Palmyra Atoll, Johnston Island, and Howland, Jarvis and Baker Islands) and Wake Island. These NWRs were expanded to include the marine areas out to 12 nm. The waters from 12 and 50 nm, although not included as part of the refuges, will be off-limits to all commercial fishing while recreational, traditional, and research fishery-related activities will be managed by NOAA. Wake Island will become a new unit of the NWRS with the same boundaries and authorities as the other units of PRIMNM.

Rose Atoll MNM includes the 20 acres of emergent lands and the 1600 acre lagoon of Rose Atoll NWR and the waters out to 50 nm from mean low water of the surrounding reef. FWS had been managing Rose Atoll NWR out to 3 nm as a de facto refuge, jointly with NOAA. NOAA is responsible for the fishery-related activities in the surrounding waters while the FWS retains authority over the existing refuge areas. The government of American Samoa is a cooperating agency in the monument.

The Marianas Trench MNM, within the waters of the U.S. Commonwealth of the Northern Mariana Islands, includes three units: the Trench Unit, which includes over 50 million acres of submerged lands around the Mariana Trench, the deepest place on earth; the Volcanic Unit, a series of active undersea volcanoes and thermal vents of significant scientific interest; and the Islands Unit, the waters surrounding the three northernmost islands in the chain. The Trench and Volcanic Units are managed as new units of the NWRS; however, the overlying waters are not included in the monument. The Islands Unit includes the waters as a no commercial fishing zone that will be managed by FWS but not as a unit of the NWRS.

The FWS is responsible for the permitting of scientific research within these three new monuments and the also the management of the existing and new NWRs while NOAA is responsible for all fishery-related activities. Overall, these three new monument designations added approximately 54 million acres to the NWRS.

Coral Reef National Wildlife Refuges

The NWRS includes some of the most visited as well as some of the most remote and pristine coral reef ecosystems. The coral reef refuges represent the most widespread collection of protected coral reefs under a single country’s jurisdiction. Many endangered and threatened species, including sea turtles and the critically endangered Hawaiian monk seal, depend on the protected waters and adjacent beaches of the coral reef refuges for breeding and nesting habitat, feeding, and hauling out.

List of Coral Reef Refuges of the National Wildlife Refuge System

National Wildlife Refuges	Year Established	Emerged /Marine Area (acres)	Significant Features
Hawaiian Islands (Northwest Hawaiian Islands, includes 7 islands)	1909	1,766 / 610,148	Haul-out and nesting beaches for sea turtles and Hawaiian monk seals (HMS), large colonies of seabirds.
Midway Atoll (Northwest Hawaiian Islands, 1100 mi NW of Honolulu)	1988	1,549 / 296,820	Sea turtles, HMS, nesting site for 18 species of seabirds, large operational airfield and port facilities serve as staging area for research.
Johnston Island (550 mi SW of Honolulu)	1926	696 / 540,865	Only land area in over 800,000 square miles of ocean, >300 species of fish, important source of larvae for Hawaiian Islands.
Kingman Reef (Line Islands, 1050 mi SW of Honolulu)	2001	3 / 483,702	Pristine highly diverse coral reef habitat, very high density of predators (inverted trophic web).
Palmyra Atoll (Line Islands, 40 mi S of Kingman Reef)	2001	680 / 515,232	PARC research facilities, operational airfield, extensive shallow perimeter coral reef shelves, reef pools, sand flats, and protected lagoons.
Baker Island (Remote Pacific, 20 miles N of the equator and 1,600 mi SW of Honolulu)	1974	405 / 409,779	Baker, Howland, and Jarvis Islands are crests of ancient coral reefs on massive submerged volcanoes, extensively mined for bird guano mined in the 1900's, vital nesting habitat for millions of seabirds (14 species), shallow reefs are fed by nutrient rich waters upwelling zones, unique under-investigated deep water coral communities, 98 species of coral, >300 species of fish.
Howland Island (Remote Pacific, 30 mi N of Baker Island)	1974	455 / 410,544	
Jarvis Island (Remote Pacific, 18 miles S of the equator and 1,300 mi S of Honolulu)	1974	1,086 / 428,767	
Rose Atoll (American Samoa, 180 miles E of Pago Pago at 14° S Lat.)	1973	13 / 1,600 37,453 jointly managed	One of smallest atolls in the world, pink fringing reef caused by the dominance of coralline algae, home to millions of seabirds, Pisonia atoll forest, and giant clams.
Guam, Ritidian Point unit (northern point of the island of Guam)	1993	371 / 401	Over 90,000 visits a year, protects 371 acres of shallow coral reefs, home to the endangered Mariana fruit bat, Mariana crow, and the *Serianthes nelsonii* tree.
Key West (Florida Keys)	1908	2,019 / 206,289	Ecologically interconnected mangrove, seagrass, and coral reef ecosystems. Heavily visited.
Great White Heron (Florida Keys)	1938	6,501 / 186,287	Ecologically interconnected mangrove, seagrass, and coral reef ecosystems. Heavily visited.
Navassa Island (Caribbean, 35 mi W of Haiti)	1999	1,285 / 363,665	No beaches, most pristine coral reefs in region, over 240 species of fish, called "Galapagos of the Caribbean."
Wake Island	2009	1,821 / 493,694	One of most isolated atolls in the world, immense diversity of endemic reef life with many yet to be identified, home to many fish and coral species not found in the Hawaiian Islands (81 coral, 190 fish).

Programs and Projects

Florida and the Caribbean

Florida Keys Refuges

FWS entered into an intra-agency agreement with the Environmental Protection Agency to provide financial support to the Water Quality Protection Program of the Florida Keys National Marine Sanctuary, which includes annual monitoring of coral reefs, water quality, and seagrass within the boundaries of the Key West and Great White Heron National Wildlife Refuges.

Navassa Island

Navassa Island NWR was established in 1999 for the purpose of the protection of the island's coral reef systems as well as of nesting seabirds and their habitat. The refuge consists of the 4.64 km^2 island and the marine area out to 12 nm surrounding the island. Several visits to document and evaluate refuge resources have been conducted by the FWS since the refuge was established, the most recent being in December of 2008. NOAA, with participation by the FWS, conducted cruises in 2002, 2004 and 2006 to conduct underwater visual censuses of fish, habitat mapping, benthic community assessments (Miller et al., 2008), multi-beam bathymetry surveys, temperature profiles, and sampling for trophic analysis via stable isotopes (Piniak et al., 2006). In addition, both FWS and NOAA have supported work by a Haitian non-governmental organization, the Foundation for the Protection of Marine Biodiversity, in the collection of information on fishing activities by Haitian fishermen as well as in providing education and outreach to the local fishing communities. Information from these NOAA cruises, work by the Foundation, and land based trips by FWS continue to provide valuable information about coral bleaching, impacts from tropical storms, coral disease, fishing pressure and techniques, and reduction in size and abundance of reef fishes.

Pacific

Midway Atoll NWR Marine Debris Coastal Monitoring Project

One of the crucial management problems facing the Papahānaumokuākea Marine National Monument is marine debris including derelict fishing gear, a major threat to the marine mammals and sea turtles. For almost 20 years the Hawaiian Islands NWR and Midway Atoll NWR have coordinated an all-volunteer effort to collect and dispose of marine debris. These efforts were expanded in 2008 with collaboration between National Fish and Wildlife Foundation, NOAA, Dow Chemical, Friends of Midway, and the FWS. The objective of the project is to develop a statistically sound and biologically relevant marine debris monitoring protocol for Midway Atoll NWR that can serve as the basis for a long-term coastal monitoring program for the entire monument. The goal is to contribute to the scientific community's understanding of how to design marine debris monitoring protocols for these coastal ecosystems.

Education and Interpretation to Midway Visitors

As the only site open for public visitation within Papahānaumokuākea, Midway Atoll NWR is the "window" to the Monument. In 2008, the FWS began welcoming back visitors to Midway to

learn, first hand, about the unique natural, cultural, and historic resources of the Monument. Limited numbers of visitors including eco-tours, university students, veterans, and history enthusiasts are provided interpretive and educational opportunities through FWS's revitalized visitor program at Midway.

Coral Reef Restoration and Protection of Rare Species at Pacific NWRs

The Pacific National Wildlife Refuge Complex launched coral reef monitoring in 1994 that expanded to all 10 Pacific coral reef refuges by 2000, as discussed below. These efforts helped to justify the removal of one shipwreck at Rose Atoll NWR, and document the need for removal of two additional shipwrecks at Palmyra Atoll NWR and Kingman Reef NWR. Moreover, monitoring has provided justification to restore marine habitats degraded by WWII military activities at Midway, Palmyra and Baker Island NWRs. Assessment and monitoring have also identified more that two dozen undescribed coral species, some of which may be rare enough to be afforded additional protection under the Endangered Species Act.

Reef Assessment and Monitoring Program in the Pacific

The FWS began establishment of permanent sites in 1999 at 17 reefs, islands and atolls where corals and other invertebrates are monitored over time. To date permanent monitoring sites have been established at all Pacific NWRs that protect coral reefs. Most of these sites were surveyed several times between 2001-2008. In 2000 and 2008, Reef Assessment and Monitoring Program (RAMP) cruises and other visits were organized to survey and monitor the Monument and Pacific Remote Island Areas in the Line and Phoenix Island groups and Johnston and Wake Atolls, including areas where military activities have continued since World War II. These efforts permitted scientists to evaluate conditions over time at 17 remote and largely uninhabited islands. First-time coral disease surveys were completed in 2004-2006 at Johnston, Baker, Howland, Jarvis Island and Kingman Reef and Palmyra to provide a basis against which to compare levels of disease prevalence in human-impacted coral reef environments. These quantitative assessments indicate a low mean overall prevalence of coral disease in the Pacific Remote Islands Refuge Complex, affecting between 0.01 and 2.8 percent of colonies. These values are comparable to the levels reported for the Northwest Hawaiian Islands (NWHI). To date the FWS initiated the effort with substantial support from NOAA, to survey 100 and resurvey all but 17 of the 100 permanent transects at the Pacific Remote National Wildlife Refuges and Papahānaumokuākea MNM through December 2008.

Palmyra Atoll Research Consortium

Representing one of the world's most pristine coral reefs, Palmyra Atoll NWR has been described as "a crown jewel of the Central Pacific". Its diverse marine habitats include steeply slopping coral reef walls, extensive and shallow perimeter coral reef shelves, reef pools, sand flats, and protected lagoons. Although the marine habitat has been impacted by previous military activities, minimal anthropogenic disturbances and the lack of heavy fishing activities produced a relative pristine ecosystem. Palmyra's submerged coral reefs support twice the number of coral species found in the Caribbean and Hawai`i and three times as many coral species as the Florida Keys. Palmyra's reefs look substantially different from all others in the equatorial Pacific, containing food webs dominated by an abundance of top predators, which have rapidly declined elsewhere. FWS, in conjunction with several NGOs, Government and University partners, formed the Palmyra Atoll

Research Consortium (PARC) in July 2004. With the recent addition of a privately funded $1.5 million research station, Palmyra has a new future as a world-class site for scientific study. This group of scientists is researching various international environmental coral reef issues ranging from climate change to invasive species. In 2008, the FWS facilitated a meeting of the PARC in San Francisco, CA. For more information on PARC visit: http://www.palmyraresearch.org/.

Documentary at Kingman Reef NWR

Kingman Reef NWR was the subject of a National Geographic expedition (July 2008) and will also be the subject, together with Palmyra Atoll NWR, of a BBC documentary with the working title "Rising Lands" to be released in spring 2009. FWS biologists participated in both projects. Thousands of photos taken during these and earlier expeditions are part of a photographic library established at the Hawai`i-Pacific National Wildlife Refuge Complex in Honolulu.

Marine Protected Areas

The FWS has worked with local partners in Palau and the Federated States of Micronesia (FSM) to increase capacity for managing and enforcing MPAs. In the FSM, the FWS provided technical assistance for community-based planning and management of MPAs, which included creating management plans, training community stewards, and delineating and marking boundaries. And in Palau, the FWS funded a project to assist the local community of Hatohobei State to delineate and manage an existing 259,000 square meter MPA at Helen Reef Atoll. Funds will be used to help the community finalize and mark the protected area and to assist them in management, monitoring, and educational activities.

Pacific Region Interagency Working Group (PRIWG) for Coral Reef Mitigation

The FWS, NOAA, EPA, USACE, Navy, Hawai'i, Guam, CNMI, and American Samoa participate as members of 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.

Land Based Sources of Pollution

FWS has partnered with the Natural Resources Conservation Service (NRCS) and local CNMI agencies to initiate a project to reduce sediment flow to coral reefs by instituting traffic restrictions and planting native vegetation at the end of a beach access road. During heavy rains, the road channeled stormwater runoff and sediment onto coral reefs at Obyan Beach, Saipan, smothering reefs and altering sea turtle habitat. The plan calls for planting 11 acres (44,515 square meters) of critically eroding area with trees and shrubs, adding mulch, and rerouting foot traffic, and implementing bioengineering techniques and other management measures.

International Projects

FWS coral reef scientists assisted in a coral reef inventory resurvey at Kosrae in July 2006; World Heritage workshops at Kiribati in 2003; and at all four states in the FSM in July 2007. They conducted field surveys at Ailinginae Atoll in the Marshall Islands in 2002 and 2006, and participated in a World Heritage nomination workshop in Honolulu in December 2008 for Ailinginae Atoll in the Marshall Islands, and have provided input to World Heritage nominations for the Kiribati Phoenix Islands, Marshall Islands and the NWHI.

Resources Available

Funding Opportunities

Below is a brief overview of funding available. For more information, please visit www.fws.gov/grants.

National Coastal Wetlands Conservation Grant Program

The Coastal Wetlands Planning, Protection and Restoration Act of 1990 was established by Title III of P.L. 101-646. Under the Program, the U.S. Fish and Wildlife Service provides matching grants to States for acquisition, restoration, management or enhancement of coastal wetlands.
http://www.fws.gov/coastal/CoastalGrants/

Partners for Fish and Wildlife Program

This program was established in 1987 with a core group of biologists and a small budget for on-the-ground wetland restoration projects on private lands. The Partners Program provides technical and financial assistance to private landowners and Tribes who are willing to work with FWS and other partners on a voluntary basis to help meet the habitat needs of our Federal Trust Species. The Partners Program can assist with projects in all habitat types which conserve or restore native vegetation, hydrology, and soils associated with imperiled ecosystems such as longleaf pine, bottomland hardwoods, tropical forests, native prairies, marshes, rivers and streams, or otherwise provide an important habitat requisite for a rare, declining or protected species. http://www.fws.gov/partners/?viewPage=home

Endangered Species Conservation Funds Grants

Provides financial assistance to states and territories to participate in a wide array of voluntary conservation projects for candidate, proposed and listed species.
http://www.fws.gov/endangered/grants/section6/index.htm

Minerals Management Service (DOI)

The mission of the Minerals Management Service (MMS) is to manage the ocean energy and mineral resources on the Outer Continental Shelf and Federal and Indian mineral revenues to enhance public and trust benefits, promote responsible use, and realize fair value.

The MMS is the Federal agency that manages the nation's natural gas, oil, alternative energy and other offshore mineral resources. The agency also collects, accounts for and disburses more than $8 billion per year in revenues from Federal offshore mineral leases and from onshore mineral leases on Federal and Indian lands. The program is national in scope and is headquartered in Washington, D.C.

As stewards of the Federal offshore lands known as the Outer Continental Shelf (OCS), the Minerals Management Service is responsible for balancing the Nation’s search for energy and marine minerals while protecting the human, marine and coastal environments. MMS environmental programs provide information necessary to support sound decisions regarding offshore energy and non-energy activities. The MMS Environmental Studies Program supports all coral related research.

Authorities and Mandates

The Outer Continental Shelf Lands Act as amended in 1978 (OCSLAA) and the National Environmental Policy Act of 1969 (NEPA) provide the agency’s primary mandate. Providing the information needed for balanced decision making is an objective of both laws. Section 18 of the OCSLAA, the foundation for Department of the Interior OCS activities, mandates that management of the OCS shall consider the “economic, social, and environmental values of the renewable and nonrenewable resources contained in the Outer Continental Shelf, and the potential impact of oil and gas exploration on other resource values of the marine, coastal, and human environments” (43 USC 1344).

In 1982, Congress passed the Federal Oil and Gas Royalty Management Act which mandates protection of the environment and conservation of Federal lands in the course of building oil and gas facilities. The Secretary of the Interior designated the MMS as the administrative agency responsible for the mineral leasing of submerged OCS lands and for the supervision of offshore operations after lease issuance.

Under a new mandate of the Energy Policy Act of 2005, the MMS is also developing an alternative energy program that will make renewable energy such as wind, wave, and ocean current energy resources on the OCS available for lease and possible development.

Organizational Structure

The MMS is comprised of two major components: Offshore Energy and Minerals Management (OEMM) and Minerals Revenue Management. The OEMM manages the petroleum, alternative energy, and non-energy mineral resources on the OCS, and is comprised of a Headquarters in Washington, D.C. and Herndon, VA and three regions: Alaska**,** Gulf of Mexico, and the Pacific**.**

The Environmental Studies Program, which manages all aspects of MMS' marine, coastal, and socioeconomic research including coral projects, is part of OEMM. The Minerals Revenue Management (MRM) collects, accounts for, and disburses revenues from Federal offshore mineral leases and from onshore mineral leases on Federal and Indian lands.

Programs and Projects

Gulf of Mexico and Caribbean Projects

MMS programs in the Gulf of Mexico include research and monitoring of coral reefs in the Flower Garden Banks National Marine Sanctuary, investigation of coral growth on oil and gas structures, research on deep-sea cold water corals, and the Rigs to Reef Program, ensuring the conservation of coral reef resources on the OCS.

Flower Garden Banks

Long-term monitoring continues in the coral-rich East and West Flower Garden Banks National Marine Sanctuary (FGBNMS), located in the Gulf of Mexico about 115 miles off the coast of Texas, in water depths of 18 to 49 meters (the flanks of the banks extend to depths up to 150 m including additional hard bottom mesophotic coral communities). The coral reef ecosystem of the Flower Garden Banks has been well characterized by studies sponsored by the MMS since the 1970s. This monitoring effort was designed to assess the health of the coral reefs, evaluate changes in coral population levels, measure coral and algae cover and growth rates, and investigate other community characteristics. The goal of the program is to address concerns related to both gradual and punctuated degradation of these unique offshore ecosystems. Such data are useful in assessing the impacts of industrial activities, as well as their value to resource management.

Monitoring results during the 2004-2006 period continue to highlight the relative health of these reefs. The occurrences of disease and bleaching were low from 0 to 0.50 percent, and the living coral cover continues to be approximately 57 percent. This high percent live cover is exceptional in comparison with other coral ecosystems in the Atlantic and Caribbean. For more information please visit:
http://www.gomr.mms.gov/homepg/regulate/environ/flow_gar/flowgard.html

The current contract co-funded by MMS and NOAA for the long-term monitoring project at the East and West Flower Garden Banks will be coming to an end in June of 2009. This important monitoring project will be renewed and continued into the future. Plans are in progress to shift the responsibility for field sampling and data analysis from contractors to staff within the Flower Garden Banks National Marine Sanctuary. The Sanctuary office intends to bring in new employees that will focus on this ongoing monitoring effort. The MMS will continue to partner with NOAA and participate in field activities. Monitoring reports will be published as both MMS and NOAA technical documents in the future.

Corals on Man-made Offshore Structures

At present, there are approximately 4,000 oil and gas platforms operating in the northern Gulf of Mexico (GOM), most of them occurring offshore from Louisiana and Texas, which shelf is comprised almost entirely of soft sediment. The platforms provide hard substratum, reaching through shallow water, where none exists or has existed for tens of thousands of years. They have provided new habitat for a wide variety of epibenthic fauna and flora, extending from the surface to a depth of hundreds of meters. Prior to the introduction of platforms, hard substratum was limited to scattered banks and shoals, mostly in deep water. Hard-bottom organisms were restricted to those banks. Platforms represent a novel development for the GOM and have provided thousands of artificial islands, affording suitable substratum for settlement of shallow-water marine organisms where, otherwise, none would be possible. Early MMS studies reported the growth of hermatypic (reef-building) scleractinian corals on the platforms in the GOM. This has been confirmed through more recent MMS studies and has been expanded to confirm the presence of both hermatypic and ahermatypic scleractinian corals on the platforms. MMS studies have demonstrated that oil and gas platforms within a 65 km radius of the Flower Garden Banks (FGB) not only possess thriving benthic communities, they also possess coral communities. An ongoing MMS study, "*Deep-Water Coral Distribution and Abundance on Active Offshore Oil and Gas Platforms and Decommissioned "Rigs-to-Reefs" Platforms"*, scheduled for completion in 2009 will provide direct information on coral genetic connectedness between platforms (both standing and Rigs-to-Reefs) and the Flower Garden Banks.

Resources Available

Funding Opportunities

The MMS marine research funding opportunities are posted on the MMS website (http://www.mms.gov/). Projects are conducted through competitive contracts, interagency agreements, and cooperative agreements with universities. The MMS also supports Cooperative Marine Research Institutes at Louisiana State University and the University of Alaska – Fairbanks.

The National Park Service (DOI)

The National Park Service preserves the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

The Associate Director, National Resource Stewardship and Science, is the lead Washington Program Office for coordinating USCRTF activities on behalf of the NPS Director under the Department of the Interior.

Authorities and Mandates

NPS authority is derived from the 1916 National Park Service Organic Act, 16 U.S.C.1. (et. seq., as amended and supplemented). The National Park Service shall "promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Organizational Structure

The NPS is headed by a Director and two Deputy Directors. The NPS organization consists of the Washington Programs Office, seven regional offices and multiple park and support units. A total of ten parks in Hawai'i, Guam, American Samoa, the U.S. Virgin Islands and Florida contain coral reef resources. These units are located in the NPS Pacific West and Southeast Regions.

Natural Resource Program Center

Effectively managing coral reef resources often involves integrating multiple scientific disciplines, legal and policy requirements, education and outreach, and partnerships. The Natural Resources Program Center (NRPC) is adopting this type of integrated approach across its five divisions to provide multidisciplinary support for coral reef management and other ocean and coastal issues, including the new Ocean and Coastal Resources Branch (OCRB) in the Water Resources Division. The OCRB coordinates coral reef activities for the NRPC including the Water Resources Division, Geological Resources Division, Environmental Quality Division and Biological Resource Management Division. For more information please visit: http://www.nature.nps.gov/

Inventory and Monitoring Networks

The NPS Inventory and Monitoring (I&M) Networks acquire and integrate scientific information to enable park managers to conserve natural resources in the National Park System. More than 270 parks with significant natural resources are organized into a system of 32 eco-regional networks linked by similar geographic and natural resource characteristics. Each network shares core funding and a professional staff to provide an efficient means of carrying out expanded inventory and monitoring activities.

The thirteen Networks acquire and integrate scientific information to support conservation of ocean and coastal resources in the National Park System. The South Florida/Caribbean and Pacific Islands Networks develop this information for coral reef parks. For example, underwater habitats in many Parks have not yet been mapped and marine plant and animal communities are unknown or poorly understood. NPS has been acquiring detailed coral reef habitat maps and assessing abundance and distribution of marine species in the coral reef parks.

The Natural Resource Program Center, parks and I&M Networks are developing these Geographic Information System (GIS) maps and databases, taking inventories of species, and designing scientifically and statistically rigorous monitoring plans (Vital Signs) to track ecological conditions of coastal and ocean resources, including coral reefs, working with U.S. Geological Survey, NOAA, state and territorial agencies and academic partners. For more information please visit:
http://www.nature.nps.gov/water/marine.cfm
http://science.nature.nps.gov/im/units/sfcn/
http://science.nature.nps.gov/im/units/pacn/

Units of the National Park System with Coral Reef Resources

A total of ten National Parks in Hawai'i, Guam, American Samoa, the U.S. Virgin Islands and South Florida contain coral reef resources and attract more than 1.5 million visits per year. NPS is working closely with states, territories, Federal agencies, academia, and the public to restore and maintain the exceptional biological and recreational values of coral reefs. The NPS is addressing the priority threats identified by the USCRTF, including coral bleaching and disease, overfishing, impaired water quality, recreational overuse, and other threats to the beauty and ecological integrity of reefs. For example, NPS established fully protected marine reserves at Dry Tortugas National Park, Buck Island Reef National Monument and Virgin Islands Coral Reef National Monument in order to restore fish populations and reef ecosystems and protect corals from physical damage. For more information, see www.nature.nps.gov/water/coralreefs.

Ten National Parks with Coral Reef Resources

Park	Marine Area	Total Park Area	Resources
Biscayne National Park (Florida) www.nps.gov/bisc	168,552 Ac.	172,925 Ac.	Tropical bay, islands, coral reefs (includes Acropora spp.), seagrass, mangrove shorelines, turtle nesting, marine mammals, historic shipwrecks & middens
Buck Island Reef National Monument (St. Croix, USVI) www.nps.gov/buis	18,839 Ac. 3.2 mi coastline	19,015 Ac.	Offshore island; patch, spur & groove, barrier reef; unusual Elkhorn coral formations (Acropora palmata.); algal plain; shelf edge; sea turtle nesting; historic ship wrecks; prehistoric conch middens
Dry Tortugas National Park (Florida) www.nps.gov/drto	64,661 Ac.	64,700 Ac.	Isolated "atoll like" coral reef area with seven keys, lagoonal patch reefs (includes Acropora spp., A. prolifera), barrier reef, and seagrass beds
Salt River Bay National Historical Park & Ecological	600 Ac. Total	912 Ac.	Mangrove shorelines; estuary; seagrass beds; fringing reefs; submarine canyons

Preserve (St. Croix, USVI) www.nps.gov/sari			
Virgin Islands National Park (St. John) www.nps.gov/viis	5,650 Ac. 36 mi. coastline	14,689 Ac. Total	Beaches; fringing reefs; patch reefs (includes Acropora spp.); seagrass beds; mangrove shorelines; tropical islands; sea turtle nesting; submerged prehistoric and historic sites
Virgin Islands Coral Reef National Monument (St. John) www.nps.gov/vicr	12,768 Ac. (all Oceanic)	12,708 Ac.	Mangrove shorelines; algal plains; raised hardbottom; patch reefs
National Park of American Samoa www.nps.gov/npsa	2,550 Ac. 20 mi. coastline	10,520 Ac.	Boundary extends 1/4 mi. offshore (6 fathom depth); Three coastal units; fringing coral reefs; spur & groove reef formations; giant clams; sea turtle nesting; humpback whales; tropical beach; and inter tidal pools
Kalaupapa National Historical Park (Hawai'i) www.nps.gov/kala	2,000 Ac. Marine	10,797 Ac.	Coral patch reefs; sea turtles; monk seals; and humpback whales
Kaloko-Honokohau National Historical Park (Hawai'i) www.nps.gov/kaho	597 Ac. Marine 1.7 mi. coastline	1,161 Ac.	Tropical bay, native Hawaiian fish ponds, anchialine pools, and coral reefs
War-In-The-Pacific National Park (Hawai'i) www.nps.gov/wapa	1,002 Ac. Marine 4 mi. coastline	1,960 Ac.	Tropical beach and fringing coral reefs, lagoon and seagrass beds

Programs and Projects

Research and Monitoring of Threatened Elkhorn Coral

A wide range of hard coral species at Buck Island Reef National Monument, St. Croix, USVI, and Virgin Islands National Park on St. John, USVI suffered from extensive bleaching and disease in 2005 and 2006, triggered by elevated sea surface temperatures. The loss of approximately 60% of live elkhorn coral (*Acropora palmata)* cover on Buck Island's barrier reef zone and approximately 30% throughout the rest of the monument is the most devastating since Hurricane Hugo in 1989. In 2008, NPS published information from coral monitoring and assessments at Buck Island that will inform designation of critical elkhorn habitats for protection under the Endangered Species Act. At Virgin Islands National Park, the NPS South Florida/Caribbean Inventory and Monitoring Network compared videotapes of 4,153 coral colonies to measure the extent of bleaching. By intensifying the frequency and scope of monitoring at St. John, NPS managers were able to detect an outbreak of white plague disease associated with the bleaching event that caused the loss of more than 50 percent of live coral cover**.** Joint coral monitoring and **c**ollaborations between NPS and USGS Caribbean Field Station and Leetown Science Center have advanced the knowledge of microbiology and disease etiology of threatened coral species.

State-Federal Partnerships on Marine Reserves and Ecosystem Based Research

"No-take" marine reserves have been established at Dry Tortugas National Park, Virgin Islands Coral Reef National Monument, and Buck Island Reef National Monument, to restore and protect marine ecosystems and species they support from overfishing and anchor damage. The National Park Service has a clear scientific mandate to evaluate the performance and potential restorative impacts of these new reserves. In response to that mandate, NPS and the Florida Fish and Wildlife Conservation Commission are implementing a joint science plan for assessing the efficacy of the 46 square-mile Dry Tortugas NP Research Natural Area. In 2007, USGS Eastern Region initiated State Partnership Program grants for "*Restoring Ecological Integrity and Resilience in Coral Ecosystems: The Role of Marine Reserves in Florida and the U.S. Virgin Islands*" as a collaborative effort between USGS, NPS and state agencies and universities. Four research projects were granted to examine ecosystem-based approaches to recovering at-risk species, restoring fish stocks and protecting biodiversity and critical habitat. This funding leveraged over $2.1 million over FY07-09 total from USGS, NOAA, Florida and U.S. Virgin Islands matching funds and in-kind support, to conduct applied research on the Dry Tortugas and Virgin Islands park reserves.

Response and Coral Restoration for Vessel Groundings in Biscayne National Park

The Park System Resource Protection Act (PSRPA) (16 USC 19jj) gives the NPS authority to respond to incidents that injure any park resource, to assess injuries, determine damages, and restore and monitor injured resources. Coral reef and seagrass resources in Biscayne National Park are frequently injured when commercial vessels and recreational boats run aground in the park's shallow waters. Working with the NPS Environmental Quality Division, Biscayne NP has settled several PSRPA cases and recovered monetary damages to assist with assessing and restoring damaged resources. Recent seagrass restorations projects involve filling blowholes or propeller scars with soil in biodegradable bags and transplanting seagrass from donor sites. Coral restoration methods include repairing fractured hardbottom surfaces and reattaching living coral. NPS is developing a Programmatic Restoration Plan/Environmental Impact Statement document to address seagrass and coral reef restoration. This document will aid managers in choosing restoration actions and streamline environmental compliance for future projects.

State-Federal Efforts to Manage Land Use Change in Pacific Islands

Rapid urbanization of uplands surrounding Kaloko-Honokohau National Historical Park, Hawai`i presents significant threats to brackish anchialine pools and nearshore coral reefs from groundwater consumption and contamination. NPS is working with state and county agencies and land developers to protect ground water quality discharging to the reef. The NPS has successfully petitioned the State of Hawai`i Land Use Commission to impose strict conditions to protect water resources from nonpoint source pollution. Kaloko Honokahau NHP also initiated the formation of a public/private Water Management Resource Group to discuss best management practices for groundwater quantity and quality. The USGS Coastal and Marine Geology Program with Stanford University scientists has collected time-series measurements of nearshore water temperature and chemistry, and waves and tidal currents, to better understand the quantity and fate of submerged groundwater discharge and associated nutrient and contaminant inputs to the coral reef ecosystems. At War-in-the-Pacific National Historical Park, Guam, NPS completed a cooperative study with the University of Guam and Territory of Guam into the effects of vegetation burning on sedimentation and water quality. Intentional fires cause

changes in native plant communities and denude areas of vegetation, which result in wildfires and high sediment runoff rates that smother corals and reduce light availability, as well as adversely affect coral survival, reproduction and recruitment. The study provided the basis to formulate fire prevention and watershed restoration options.

Funding Opportunities

National Park Foundation Grants and Programs

Working independently and with partners, the National Park Foundation funds grants and programs that meet priorities and critical needs across our National Park System in the areas of youth, community outreach, conservation and professional engagement. The Foundation actively supports the National Park Service in its goal to prepare national parks for another century of conservation, preservation and enjoyment by its 100th anniversary in 2016. For more information about the National Park Foundation, visit www.nationalparks.org.

Internships, Volunteer and Temporary Positions

Internships

A variety of internship opportunities with the National Park Service are available at many parks and various centers and offices. Many parks list internships on their website in the 'Support Your Park' section. For more information, contact the parks directly or visit http://www.nps.gov/gettinginvolved/internships/index.htm

The Student Conservation Association (SCA)

The SCA, a non-profit organization, places more than 3,800 people in internships every year. Most interns work in National Parks and perform duties varying from visitor interpretation services to natural resource restoration and management. For more information, visit www.thesca.org

Volunteers-in-Parks (VIP)

Volunteering is an American tradition that empowers and contributes to communities, organizations, and individuals throughout the country. The National Park Service VIP program was authorized by Public Law 91-357 enacted in 1970. Many parks list volunteer opportunities on their website in the 'Support Your Park' section. For more information, contact the parks directly or visit http://www.nps.gov/gettinginvolved/volunteer/index.htm

Temporary and Seasonal Employment

To meet the needs of visitors and help manage and protect park resources, the NPS hires approximately 10,000 temporary and seasonal employees annually. While temporary positions are available in a range of career fields, most jobs available are in the categories of Visitor Use Assistants; Park Guides & Interpreters; Biological Science Technicians; Park Rangers; Seasonal Maintenance Positions. Seasonal positions are advertised and filled directly by NPS Human Resources Offices around the country. All job openings can be found on www.USAJobs.gov, the official job site for the United States Federal Government. Just go to USAJobs, click on Search Jobs and type in "NPS" to find a complete listing of seasonal and permanent job opportunities and application procedures.

Office of Insular Affairs (DOI)

The Office of Insular Affairs (OIA) carries out the Secretary of the Interior's responsibilities for the insular areas. OIA's major charge is to coordinate Federal policy and to provide technical and financial assistance to the territories of the U.S. Virgin Islands (USVI), Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (CNMI). The office also provides technical and financial assistance to the Freely Associated States (FAS) of the Federated States of Micronesia (FSM), the Republic of the Marshall Islands, and the Republic of Palau. The financial assistance OIA provides is to improve government operations and infrastructure, recognizing that local tax revenues and other Federal programs are insufficient to meet the unique political, social and economic needs of the islands. Much of this assistance is in the form of mandatory funding and is the product of negotiated long-term agreements.

U.S. territories and FAS total fewer than 2,000 square miles of land in aggregate (excluding Puerto Rico), but are distributed over more than 3,000,000 square miles of ocean - an area equivalent to the conterminous U.S. Thus, the insular areas represent a significant portion of waters under U.S. jurisdiction. They also are home to some of the most extensive and biologically diverse coral reef ecosystems in the world. Islanders have long harvested these resources for a wide range of utilitarian, symbolic and ornamental functions. Coral reefs also protect these island communities from coastal erosion and storm damage, provide habitat to numerous species, and support important tourism and recreational industries. Rapidly growing populations, poor land-use practices, and over-exploitation of nearshore resources have severely degraded many of these ecosystems.

Through its Coral Reef Initiative, OIA is playing a critical role in the national effort to conserve coral reefs by working with the U.S.-affiliated insular areas to enhance the management and protection of their coral reef resources. For more information please visit http://www.doi.gov/oia/Firstpginfo/coralreef.html

Authorities and Mandates

Under 48 U.S.C. 1469(d), the Secretary of the Interior is authorized to provide technical assistance in the form of "research, planning assistance, studies, and demonstration projects" through reimbursements to other agencies, grants to the insular governments, or employment of private individuals, partnerships or corporations.

Organizational Structure

OIA is under the Assistant Secretary for Policy, Management and Budget. OIA is headed by the Deputy Assistant Secretary for Insular Affairs whose director oversees three divisions: Policy, Budget and Technical Assistance.

Programs & Projects

Caribbean Region

Salt River Bay Marine Research and Education Center; St. Croix, USVI

A partnership among the National Park Service (NPS), OIA and a consortium of universities (Rutgers, the State University of New Jersey; the University of North Carolina, Wilmington; the University of the Virgin Islands and the University of South Carolina) known as the Joint Institute for Caribbean Marine Studies (JICMS) is working to build a major marine research and education center (MREC) at the Salt River Bay National Historical Park and Ecological Preserve, St. Croix.

The Salt River Bay MREC will support research and education programs that will address the rapidly declining health of coral reef ecosystems throughout the Caribbean and other tropical regions of the world. The MREC will also support science-based management for two new marine parks in St. Croix and throughout the region, provide student education and promote public awareness of the economic and cultural heritage of the tropical oceans.

OIA has contributed $670,000 for the planning and design of the facility. With the feasibility study and environmental assessment completed, the stage is set to begin the design phase. The proposal is to build the MREC not only as a center of excellence for marine research and education, but also as a “green demonstration project” for the NPS and the insular areas. It would be among the first marine research centers and NPS facilities to be designed to use renewable energy such as wind and solar power and to minimize impacts to surrounding sensitive habitats such as the watersheds and adjacent marine areas.

Pacific Region Projects

The Micronesian Challenge

In 2006, the Presidents of Palau, the Federated States of Micronesia, and the Marshall Islands, and the Governors of Guam and the CNMI, committed to protect at least 30 percent of near-shore marine resources and 20 percent of terrestrial resources across Micronesia by 2020.

Covering 6.7 million square kilometers of ocean, the Micronesia Challenge represents more than 20% of the Pacific Island region – and 5% of the largest ocean in the world. The Challenge will help protect at least 66 known threatened species, 10% of the global total reef area and 462 coral species – that is 58% of all known corals.

OIA supports the Challenge through funding for local resource planning projects and participation on advisory and planning committees that assist the jurisdictions in meeting the objectives of the Challenge.

The Micronesia Challenge has gained international recognition and is being copied in other regions, including the recently proposed “Caribbean Challenge.”

Resources Available

Since 1994, OIA has worked closely with island governments to identify local and regional priorities for protection and sustainable use of their marine resources, and especially their coral reefs. The priorities have been summarized in the *U.S. All Islands Coral Reef Initiative Strategy* (1999), Local Action Strategies (LAS) developed by each jurisdiction and annual requests for

financial assistance. The *Strategy* was a cornerstone of the *National Action Plan to Conserve Coral Reefs*, adopted by the USCRTF in March 2000 while the LAS have laid out specific areas of need for individual jurisdictions.

Funding Opportunities

OIA provides technical assistance primarily to the territorial governments, although grants to other individuals or institutions may be made with the support of the Chief Executive of the affected insular area. Grant applications, in the form of a narrative proposal and detailed budget, are reviewed and awarded as they are received throughout the year. A detailed handbook on OIA's grant programs is available at:
http://www.doi.gov/oia/budget/budhist/Complete_Manual_2.doc

Coral Reef Initiative

Since 2000, OIA's Coral Reef Initiative has awarded $500,000 annually in direct grants to the insular areas for coral reef conservation and management projects. In partnership with the NOAA, OIA provides this technical assistance to support insular area efforts to conserve and protect coral reef ecosystems. Grants support a broad range of projects designed to fill gaps in management capacity and to develop a comprehensive marine resource management program within each of the areas. Local Action Strategies, developed by each of the U.S. territories, form the basis for a significant portion of the insular area annual grant awards.

In 2008, OIA received an increase of $479,000 for its coral reef initiative to support the Micronesia Challenge and the partnership to build a new marine research and education center at Salt River Bay National Historical Park and Ecological Preserve in St. Croix, USVI. In addition, funds from other programs within OIA support projects that improve the health of coral reefs, such as expanding or constructing new wastewater treatment facilities or reducing run-off, both of which increase water quality over the adjacent reefs.

Other grants that may apply to coral reef conservation and management projects include:

Capital Improvement Program (CIP) Grants

OIA's Capital Improvement Program (CIP) provides funds to support a variety of infrastructure needs in the U.S. territories including critical infrastructure like hospitals, schools and wastewater systems ($27.7 million in FY05). A unique feature of CIP funds is that they may be used to meet the local matching requirement for capital improvement grants of other Federal agencies, subject to OIA's approval. Territories request CIP funds through the annual grants process; funds may be used, as in the U.S. Virgin Islands beginning in FY05, for wastewater treatment.

General Technical Assistance

These grants are for short-term, non-capital projects and may be submitted for consideration at any time during the fiscal year ($11.7 million appropriated in FY05).

Maintenance Assistance

Focuses on improving maintenance through training, education and technical advice ($2.3 million in FY06).

OIA

Water and Wastewater Projects

This $1 million item requested in the President's Budget supports the critical goals of improving water quality in the waters of jurisdictions.

Fellowships Offered

Micronesia Challenge Conservation Champions

The Micronesia Challenge is seeking conservation "champions" to design and carry out outreach and educational programs. Each "champion" will receive $5,000 in stipends, a laptop, and funded travel for workshops and training. Applicants must be citizens or permanent residents of Micronesia and either currently enrolled in a college or university or a recent college graduate. For more information, contact Willy Kostka, director of the Micronesia Conservation Trust at mctdirector@mail.fm.

U.S. Geological Survey (DOI)

As a bureau within the Department of the Interior (DOI), the U.S. Geological Survey (USGS) (http://www.usgs.gov/) serves the Nation by providing reliable and unbiased scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life. In collaboration with partners, the USGS reports on the state of the Nation's terrestrial, freshwater, and marine ecosystems and studies the causes and consequences of ecological change, monitors and provides methods for protecting and managing the biological and physical components and processes of ecosystems, and interprets for policymakers how current and future rates of change will affect natural resources and society.

The USGS is the only Federal agency that combines scientific expertise in biology, hydrology, geology, and geography and thus is uniquely positioned to advance scientific understanding of mankind's influence on ecosystem processes and the changes that are occurring that affect our well-being. Most of the funding support for coral mapping, monitoring and research comes primarily from two (of about 30) USGS programs: the Coastal and Marine Geology Program (http://marine.usgs.gov/) and the Terrestrial, Freshwater, and Marine Ecosystem Program (http://biology.usgs.gov/ecosystems/).

Coral Science Plan

The USGS Coral Science Plan, *Strategic Science for Coral Ecosystems, 2007-2011* describes the information needs of resource managers to address threats to coral reef ecosystems and summarizes relevant mapping, monitoring, and research being conducted by USGS scientists and partners. It outlines important research actions that need to be undertaken to achieve more accurate forecasting of future conditions and develop more effective decision-support tools to adaptively manage coral ecosystems. The overarching outcome of this Plan, if fully implemented, would enable decision-makers to better protect and sustain coral ecosystem services. These services include sources of food, essential habitat for fisheries and protected species, protection of coastlines from wave damage and erosion, recreation, and cultural values for indigenous communities. The USGS Coral Science Plan is responsive to the *Ocean Research Priorities Plan and Implementation Strategy*, and to recommendations of the USCRTF. The Plan addresses information needs of DOI Bureaus and aligns with the *USGS Bureau Science Strategy.* To view the USGS Coral Science Plan, visit http://marine.usgs.gov/coral-plan/coralplan2007.pdf

Authorities and Mandates

USGS is authorized to conduct surveys, investigations, and research under the Organic Act (43 U.S.C., Article 31) which established the USGS. USGS has authority (Publ. L. 106-291, 114 Stat.932) to use cooperative agreements, grants, and contracts to carry out its mission. The Fish and Wildlife Coordination Act also authorizes the DOI to investigate and report on actions that affect all species of wildlife and their habitat.

Organizational Structure

The USGS is organized under a Director, with Headquarters in Reston, VA. Western, Central and Eastern Regional Directors are located in Seattle, Denver, and Reston, respectively. Within each Region, three (sub-regional) Area Executives have oversight for the USGS Science Centers. Over 9,000 USGS scientists, managers, and support staff are employed nation-wide, at Reston Headquarters, at Science Centers and Field Offices in each state and in Guam, Puerto Rico, and the U.S. Virgin Islands.

USGS Science Centers

The primary USGS Science Centers that map, monitor and/or conduct research on shallow-water corals and coral ecosystems (including coral reefs, mangroves, seagrasses and adjacent watersheds) include:

- Florida Integrated Science Center, Gainesville and St. Petersburg, FL (http://fisc.er.usgs.gov/)
- Leetown Science Center, Leetown WV (http://www.lsc.usgs.gov/)
- Earth Surface Processes Team, Reston, VA (http://geology.er.usgs.gov/eespteam/)
- National Wildlife Health Center, Madison, WI (http://www.nwhc.usgs.gov/)
- Columbia Environmental Science Center, Columba, MO (http://www.cerc.usgs.gov/)
- Pacific Island Ecosystems Research Center, Honolulu, HI (http://biology.usgs.gov/pierc/index.htm)
- Western Coastal and Marine Geology, Santa Cruz, CA (http://walrus.wr.usgs.gov/)
- National Wetlands Research Center, Lafayette, LA (http://www.nwrc.usgs.gov/)

Institutions that are interested in partnering with USGS marine scientists should peruse these Centers web sites to learn about the nature and scope of current projects and associated expertise.

Programs and Projects

Current and planned USGS activities are aimed at addressing priorities identified in the *Strategic Science for Coral Ecosystems 2007-2011* planning document, which encompasses the following three themes and associated actions:

Theme 1: Reef Structure, Ecological Integrity, and the Role of Marine Reserves

Mapping and Characterizing Shallow Coral Ecosystems

USGS scientists use remotely sensed data from Hawai`i, U.S. Pacific Islands, the Florida Keys, the Caribbean, and the Gulf of Mexico to detect, map, and sample reef areas to assess coral cover, algae, silt, sand, and other types of benthic habitat. Interpretation of the remotely sensed data is corroborated by field mapping and in situ measurements of coral cover. While various remote sensing techniques (such as aerial photography and other imaging techniques) provide location information, snorkel and scuba equipment, Remotely Operated Vehicles (ROVs) and submersibles allow USGS scientists to directly identify coral species and make estimates of living coral coverage and biodiversity. In-the-water observations, including underwater photography and geo-referenced videography provide

records that can be incorporated into maps and used to understand subtle changes in the reef ecosystem. Examples of technology under development by USGS that relate to reef mapping include:

- Lidar (light detection and ranging)-derived submarine topographic (bathymetric) maps are being produced as collaborative efforts between USGS, NPS, and NASA. As part of this project, data from an innovative instrument under development by NASA, called the Experimental Airborne Advanced Research Lidar (EAARL), are being used. Examples of EAARL studies include: Florida Keys National Marine Sanctuary (http://pubs.usgs.gov/of/2007/1395/start.html); Gulf Islands National Seashore (http://pubs.usgs.gov/of/2007/1422/start.html); and Dry Tortugas NP (http://pubs.usgs.gov/of/2006/1244/start.htm)
- The Along-Track Reef Imaging System (ATRIS) was developed by USGS to provide resource managers with highly detailed, geo-referenced benthic-substrate observations for monitoring and mapping coral reef ecosystems. ATRIS is a boat-based sensor package that allows rapid mapping of shallow-water (<10 meters) benthic environments. ATRIS combines high-resolution bathymetry, underwater color digital photography, underwater video, vessel-heave compensation, and differential Global Positioning System (GPS) data to provide photographic and video transects of the sea floor keyed to precise geographic locations and water depths. ATRIS has been used to collect shallow-water observations for several areas in the Florida Keys and Dry Tortugas National Park.

Lidar surveys and high-resolution benthic habitat mapping has been conducted on the fringing coral reef of Molokai, Hawai`i, and the results are available at the following links:
Molokai Atlas (http://pubs.usgs.gov/sir/2007/5101/)
Molokai benthic habitat mapping (http://pubs.usgs.gov/of/2005/1070/)
Molokai lidar bathymetry (http://pubs.usgs.gov/sim/2005/2886/)

Detailed mapping conducted with the National Park Service in Hawai`i, is available for the following National Parks:

- Pu'ukohola Heiau National Historic Site benthic habitat mapping (http://pubs.usgs.gov/sir/2006/5254/)
- Kaloko-Honokohau National Historical Park benthic habitat mapping (http://pubs.usgs.gov/sir/2006/5256/)
- Pu'uhonua O Honaunau National Historical Park benthic habitat mapping (http://pubs.usgs.gov/sir/2006/5258/)

Microbial Ecology of Corals

Coral-associated microbiological studies by USGS are underway in the U.S. Virgin Islands, Florida Keys, and American Samoa. Studying coral microbes is important because coral reefs, particularly those in the Caribbean, show a relatively high incidence of disease. The few coral diseases that have been characterized are all caused by microorganisms.

Ecology of Shallow Reefs

USGS research spans process studies involving biologic, ecologic, meteorologic, geologic, and hydrologic components of the coral ecosystems. These efforts include water-quality analyses, ground-water modeling, hydrogeologic-data collection, ecologic-habitat evaluations, coral reef rehabilitation/enhancement, biodiversity and endemism of fishes studies, seagrass and mangrove

characterizations, biogeochemistry of ecosystems, and paleo-ecologic analyses. Relevant information is provided for important resource protection and restoration issues, including the effects of environmental stressors (climate change, pollutants, contaminants, destructive fishing practices, invasive species and disease) and the role and function of marine reserves.

Florida (Dry Tortugas) and U.S. Virgin Islands - In collaboration with the NPS and NOAA, the *2007-2009* USGS Eastern Region, State Partnership Program funded four research projects in the Dry Tortugas National Park and parks in the U.S. Virgin Islands, including:

- Trophic coupling and habitat connectivity in coral reef, mangrove, and seagrass benthic invertebrate communities of the Virgin Islands National Park and Coral Reef National Monument
- Physical and Biological Connectivity of Virgin Islands Coral Reefs: the Potential for Recovery of Reefs within Virgin Islands National Park, Virgin Islands Coral Reef National Monument, and Buck Island Reef National Monument
- Efficacy of a newly-established Research Natural Area (RNA) for protecting coral reef fishes within Dry Tortugas National Park
- Coral-Algal-Herbivore Interactions in Protected versus Unprotected Reef Ecosystems

Additional research scheduled in the Dry Tortugas includes: retrospective analyses (paleo-history) from coral cores to evaluate past environmental conditions; habitat mapping to classify presently unknown areas and identify areas of particular value for harboring endangered sea turtles; and rates of coral calcification as influenced by various stressors.

Hawaiian Islands and other Pacific Islands, including Guam, American Samoa, and Palmyra Atoll - research currently underway or planned to begin this year includes: disease incidence in corals, fishes, and sea turtles; impacts of invasive species.

Theme 2: Land-based and Local Impacts

Freshwater Flux and the Sources, Fates, and Effects of Sediments and Pollutants

USGS studies on the impacts of surface and groundwater inflows containing sediments and/or pollutants and their flux over shallow water reefs have included studies in Hawai`i, Guam, south Florida and Biscayne Bay. In Hawai`i and Guam, the focus has been on “ridge to reef” issues associated with land use, water use and effects of freshwater-borne sediments and nutrients on reefs. Questions being addressed include: what are the sediment sources; how much sediment is being transported; how long does the sediment stay on reefs; and what impact does the sediment have on the reef communities. At Kona, Hawai`i, USGS is studying the flux of pollutants through the Kaloko-Honokohau National Historical Park lands from groundwater sources in adjacent watersheds. Geological and oceanographic (transport) process studies are components of these investigations. In Florida, information on pollutant sources, transport, distribution, and accumulation in sediments is coupled with sub-regional models to give an integrated comprehensive assessment of how different management scenarios will affect water flows in both Everglades National Park and Biscayne National Park and how the parks’ living resources will be affected.

Wastewater Threats

In the Florida Keys, USGS researchers have recently used coral mucus to demonstrate the presence of specific human viruses in nearshore reef environments. Coral mucus, as a nutrient-rich coral biofilm, is an ideal natural "flypaper" that can trap passing viruses from the overlying water column. Moreover, human-specific wastewater-associated viruses are detectable at outer-reef sites in a nearshore-to-offshore-transect .These studies and others like it will aid regional ecosystem and public-health officials in addressing management issues for protecting human as well as coral health.

The USGS has conducted comprehensive studies of the transport and fate of sediment and its effect on coral reefs of Hawai`i and Guam. A compendium of new findings *The Coral Reef of South Moloka'i, Hawai'i-Portrait of a Sediment-Threatened Fringing Reef.* is available at http://pubs.usgs.gov/sir/2007/5101/. Related papers on sediment transport and its impact on corals throughout Hawai`i are available at http://coralreefs.wr.usgs.gov/pubs.html

Theme 3: Responses to Global Change

Coral Mortality and African Dust

The widespread geographic occurrence of disease on Caribbean reefs and the continuing lack of recovery of damaged reefs is perplexing, given that these declines are occurring on reefs remote from, as well as near to, human activities. What would be a large scale process that could explain this pattern of continuing coral reef decline? USGS scientists have hypothesized that African and Asian dust air masses transport nutrients (iron, nitrates, and other nutrients), persistent organic pollutants (pesticides, polyaromatic hydrocarbons, polychlorinated biphenyls, dioxins and furans) and viable microorganisms that may adversely affect human health and downwind ecosystems such as coral reefs. Hundreds of millions of tons of African dust are transported annually from the Sahara and Sahel to the Caribbean and southeastern U.S. The quantities of dust vary annually as a result of global climate, local meteorology, geomorphology of source areas, and human activities.

Ocean acidification

In collaboration with researchers at the University of Hawai`i, USGS has conducted a long-term, small-scale controlled investigation of the effects of ocean acidification on coral reef organisms. These studies indicate that projected increases in the partial pressure of CO_2 (pCO_2) in the oceans resulting from anthropogenic burning of fossil fuels could have severe impacts on coral reef ecosystems with critical levels being surpassed by 2100. There is also concern that the recruitment and growth of encrusting coralline algae, which are very important occupiers of hard substratum on reefs across the globe, could also see a severe reduction.

USGS scientists are undertaking a series of field-based monitoring and process studies and retrospective analyses on coral skeletal material at different locations in the Gulf of Mexico to investigate the impact of changing temperature and pH on the calcification rates of corals and other selected calcifying organisms and monitor changes in ocean chemistry in shallow carbonate environments. Specific efforts will include:

- Investigations of present-day coral calcification rates in important reef-building species in relation to season, temperature, and carbonate system parameters and changes in seawater temperature and pH using climate proxies in coral cores.
- Testing and calibration of newly developed analytic equipment for monitoring seawater carbonate system parameters and for use in large-scale incubation chamber experiments on reef metabolism, calcification, and carbonate dissolution in the shallow carbonate environment.
- Quantifying the relationship between past changes in growth and calcification rates and changes in seawater temperature and pH using climate proxies in coral cores.

Bleaching and the Tolerance of Corals to High Water Temperatures

In cooperation with NPS, University of Hawai`i, Florida Institute of Technology, and Wildlife Conservation Society, studies are underway in the National Park of American Samoa to determine the internal and external factors that increase the ability of a wide variety of corals to resist environmental stress. Experiments are 1) determining whether the survival and differential growth rates of corals that are tolerant of high temperatures reflect genetic adaptations or other kinds of environmental control and 2) evaluating environmental factors that influence bleaching (loss of zooxanthellae) when corals are subjected to high water temperatures. Also, because changes in the coral-associated bacterial communities echo changes in the health of the coral, bacteria are, at a minimum, attuned to their host's metabolism and may play an active role in maintaining the overall health of the coral. Hence, assessments are testing whether changes in the microbial community may be used as “early warnings” of coral bleaching and disease. (see http://coastal.er.usgs.gov/coral-microbes/climate-change.html)

In collaboration with the NPS, long-term monitoring of coral reefs in the U.S. Virgin Islands is providing valuable insights into the complex interactions of coral bleaching, recovery, pathogens, and disease processes with environmental variables such as water temperature, sunlight, dissolved oxygen, and water circulation.

Resources Available

The majority of the mapping, monitoring, and research that USGS undertakes is conducted with one or more partners, collaborators, or cooperators. These stakeholders often include other DOI Bureaus (NPS, FWS , MMS, BLM), other Federal Agencies (NOAA, NASA, EPA, USACE), coastal states, and academic institutions. Depending on their level of engagement and specific information needs, stakeholders generally contribute to project development and implementation with direct funding, Federal or non-Federal matching funds, expertise, and/or in-kind services. Joint research opportunities are often solicited through topical workshops and meetings and sometimes by direct contacts between USGS scientists or managers and scientific colleagues or managers from other institutions.

Fellowships and Student Opportunities

The Mendenhall Postdoctoral Research Fellowship Program

The Mendenhall Program provides an opportunity for postdoctoral fellows to conduct concentrated research in association with selected members of the USGS professional staff, often as a final element to their formal career preparation. The program is also intended to

provide research experience that enhances their personal scientific stature and credentials. The Mendenhall Postdoctoral Research Fellowship Program is envisioned to bring current scientific expertise to assist in the implementation of the broad-based *USGS Bureau Science Strategy*, which includes, but is not restricted to, coral ecosystem science. For more information visit: http://geology.usgs.gov/postdoc/

NIWR-USGS Student Internship Program

This program provides undergraduate and graduate students with career-enhancing field, laboratory, and research experience through participation in USGS activities as interns. The program is a collaborative effort between the USGS and the National Institutes for Water Resources (NIWR) in selected States.

Coral Related Publications and Documents

For references to published papers, conference talks and posters with abstracts, and invited talks by USGS scientists, please visit http://coralreefs.wr.usgs.gov/pubs.html

U.S. Agency for International Development

The mission of the U.S. Agency for International Development (USAID) is to extend a helping hand to those people overseas struggling to make a better life, recover from a disaster or striving to live in a free and democratic country.

USAID is the independent government agency that provides economic and humanitarian assistance in sub- Saharan Africa, Asia and the Near East, Latin America and the Caribbean, and Europe and Eurasia. The agency works in 100 developing countries and in close partnership with private voluntary organizations, indigenous groups, universities, American businesses, international organizations, other governments, trade and professional associations, faith-based organizations, and other U.S. government agencies. USAID has working relationships, through contracts and grant agreements, with more than 3,500 companies and over 300 U.S.-based private voluntary organizations.
Through public and private partners, USAID supports coral reef and mangrove forest conservation activities in over 25 countries. Activities aim to:

- Reduce land-based sources of pollution
- Address overfishing, destructive fishing, and adverse trade impacts
- Promote sustainable tourism, including “green” and fair tourism
- Address coral bleaching and coral diseases
- Promote environmental awareness and stewardship

USDA is represented at the USCRTF by the **Office of Natural Resources Management** (ONRM). ONRM is tasked with the oversight and management of USAID programs that affect the sustainable use of natural resources: forests, biodiversity, land and water.

Authorities, Mandates and International Agreements

Foreign Assistance Act

On September 4, 1961, the Congress passed the Foreign Assistance Act, which reorganized the U.S. foreign assistance programs including separating military and non-military aid. The Act mandated the creation of an agency to administer economic assistance programs, and on November 3, 1961, President John F. Kennedy established the U.S. Agency for International Development.

Convention on the International Trade of Endangered Species (CITES)

CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES conservation goals are to: monitor international trade in endangered species; maintain those species in an ecological balance; and assist countries toward a sustainable use of species through international trade. As of 2007, 172 Parties have adopted the Convention.

Executive Order 13089, "Coral Reef Protection" Section 5 (d)- International Cooperation. The Secretary of State and the Administrator of the Agency for International Development, in cooperation with other members of the USCRTF and drawing upon their expertise, shall assess the U.S. role in international trade and protection of coral reef species and implement appropriate strategies and actions to promote conservation and sustainable use of coral reef resources worldwide. Such actions shall include expanded collaboration with other International Coral Reef Initiative (ICRI) partners, especially governments, to implement the ICRI through its Framework for Action and the Global Coral Reef Monitoring Network at regional, national, and local levels.

Organizational Structure

USAID has three functional bureaus: Global Health; Democracy, Conflict, and Humanitarian Assistance; and Economic Growth, Agriculture and Trade. The USCRTF representative office, the Office of National Resource Management, is within the Agriculture and Trade bureau. For environmental programs, the Office of Natural Resources Management identifies biodiversity hotspots and then develops environmental programs and initiatives. The actual programs are funded by USAID via competitive grant processes and implemented by third parties (often global NGOs in alliance with local governments). Evaluation for each project is performance-based.

Regions

USAID supports three marine ecoregions of global significance – the East African Marine Ecoregion, the Meso-American Reef region, and the South East Asian Coral Triangle in Indonesia, the Philippines and Papua New Guinea – in partnership with the World Wildlife Fund, the Nature Conservancy, the Wildlife Conservation Society, and the International Coral Reef Action Network. Please refer to Appendix section for a list of specific USAID-funded projects.

Programs & Projects

USAID's activities directly support coral reef and mangrove forest conservation internationally. Activities range from field programs in best management practices and monitoring, to the establishment and improvement of marine parks and reserves, to improvements in coastal tourism and fisheries management, to Integrated Coastal Management (ICM) and larger seascape approaches. USAID Coral Reef projects are available at: http://www.usaid.gov/our_work/environment/water/coral_reefs.html

The Global Conservation Program

This program is a partnership with six U.S.-based conservation organizations to address the most pressing threats to species-rich land and seascapes around the world. Regional coral reef projects under this program include: Eastern Africa Marine Ecoregion in Kenya, Tanzania, and Mozambique; Glover's Reef Seascape in Belize; Meso-American Reef in Mexico, Belize, Guatemala, and Honduras; Wakatobi National Park and Raja Ampat Islands in Indonesia; and Kimbe Bay in Papua New Guinea.

Management of Marine Protected Areas and Sustainable Fisheries

USAID is supporting marine protected areas, fishery reserves, and marine national parks of regional and international significance in Indonesia, the Philippines, Papua New Guinea, Egypt, Kenya, Tanzania, Mozambique, Dominican Republic, Ecuador, Brazil, Honduras, Nicaragua, Mexico and Panama, as well as several transboundary sites.

WorldFish Center

USAID provides core support to the WorldFish Center for research and management on sustainable fisheries and mariculture.

International Cooperation Programs

USAID, in partnership with other Federal agencies, was instrumental in establishing the International Coral Reef Initiative (ICRI**)** and in developing ICRI's Call to Action and Framework for Action, which are based upon ICM principles promoted in Agency projects worldwide. The USAID continues to support the goals and efforts of ICRI.

USAID also contributes technically and programmatically to the Global Program of Action (GPA) for the control of Land-Based Sources of Marine Pollution, the Meso-American Reef Alliance Initiative, the Middle East Regional Cooperation (MERC) project of the Middle East Peace Process, the Convention on International Trade of Endangered Species of Fauna and Flora (CITES), the Convention on Biodiversity Conservation, the Asia Pacific Environmental Cooperation forum, and other regional and global efforts contributing to the conservation and sustainable use of coastal and coral reef resources.

Highlighted Projects

Fisheries Improved for Sustainable Harvest (FISH), Philippines

FISH aims to conserve biological diversity in at least four biologically and economically important marine ecosystems in the Philippines, as measured by an increase in fish stocks and the maintenance of selected coastal resources that support them with environmental services. FISH is working with the Government of the Philippines and local communities to implement sound fisheries governance, adopt an ecosystem-based approach to fisheries management, and

address illegal fishing. FISH works in four large regions - Tawi-Tawi Group of Islands, Danajon Bank, Lanuza Bay, and Calamianes Islands - and nationally to address overfishing and destructive fishing and promote sustainable practices, as well as assisting in development and implementation of national fisheries policies.
http://philippines.usaid.gov/oee_envgov_marine_fish.php

North Sulawesi MPA, Indonesia
Three pilot Marine Protected Areas (MPAs) established through the Water Team's Indonesia project, Proyek Pesisir, are yielding significant ecological, economic, and infrastructure benefits to the fishermen and coastal communities of North Sulawesi. Coral cover and fish abundance is improving, bomb fishing is on the decline, ecotourism and new agriculture and seaweed farming activities are generating revenues, and numerous infrastructure improvements have been implemented. An additional 24 sites are now looking to establish community MPAs.

Wakatobi National Park and Raja Ampat Islands, Indonesia
USAID, in a partnership with the Nature Conservancy and the World Wildlife Fund, contributes financial resources to conserving Wakatobi National Park and Raja Ampat Islands. Wakatobi is the largest marine national park in Indonesia, while the Raja Ampat Island are considered by the Nature conservancy to be the "diversity epicenter of the Coral Triangle."

Kimbe Bay, Papua New Guinea
In a partnership with the Nature Conservancy, USAID assists in funding the Kimbe Bay MPA network. Kimbe Bay contains nearly 60 percent of the coral species of the entire Indo-Pacific. For more information, please visit

These USAID programs are centered on marine resources in many parts of the world and often involve coral reef areas:

Country	Program	Partners
Africa		
Kenya	Global Conservation Program: East Africa Marine Ecoregion Program - Kiunga Marine National Reserve. (Lamu Archipelago seascape on the Kenya-Somalia border)	WWF, park officials, local NGOs, universities
Mozambique	Global Conservation Program: East Africa Marine Ecoregion Program - Quirimbas National Park. (The total area of the park is 750,639 hectares—of which 152,237 hectares are in marine and island habitats.)	WWF, park officials, local NGOs, universities
Tanzania	SEMMA Project. Links biodiversity conservation with economic opportunities in wildlife and coastal resources in targeted ecosystems by shifting a focus from centralized policy to decentralized decision-making.	ACDI VOCA, local communities, local and national government
Tanzania	Sustaining Coastal Communities and Ecosystems (SUCCESS): Menai Bay	University of Rhode Island, local community, Univ. of Hawai`i at Hilo
AFR Regional Programs	Sustainable and Thriving Environment for West African Regional Development (STEWARD): conducting an initial assessment of threats to terrestrial and marine biodiversity, including fisheries, along the west coast of Africa in preparation for follow-up activities	USFS, local experts and communities, governments

Indonesia	Global Conservation Program: Support for the Establishment of Effectively Managed Platform Sites as Foundations for Resilient Networks of Functionally-Connected Marine Protected Areas (SEEMPS-MPAS): Raja Ampat Islands (Large-scale regional planning for ecosystem-based approaches to fisheries management, conservation of spawning sites, regulation and enforcement)	TNC, local communities, local NGOs, local and national government, universities, Ministry of Fisheries and Marine Affairs
Indonesia	Global Conservation Program: SEEMPS-MPAS): Wakatobi National Park (Large-scale regional planning for ecosystem-based approaches to fisheries management, conservation, enforcement)	TNC, local communities, local NGOs, local and national government, universities, Ministry of Fisheries and Marine Affairs
Papua New Guinea	Global Conservation Program: SEEMPS-MPAS) Kimbe Bay and Bismarck Sea (Locally Managed Marine Areas; Large-scale regional planning for ecosystem-based approaches to fisheries management, conservation of spawning sites, regulation and enforcement)	TNC, Fisheries Department, local communities, local level government units, Mahonia na Dari
Philippines	Fisheries Improved for Sustainable Harvest (FISH): Goal is to increase fish stocks by 10% through an ecosystem-based approach to fisheries management.	Tetra Tech INC., local and national governments, local communities, local universities, local NGOs
Philippines	Coastal Resources and Fisheries Project (CRFC)	DAI, local governments, national government, local NGOs
Thailand	Post-tsunami Sustainable Coastal Livelihoods Project	Univ. Rhode Island, Asian Institute of Technology, Univ. Hawai`i at Hilo, local communities and government.
Middle East		
Egypt	LIFE program; Red Sea coastal tourism and coral reef conservation	Contractors
Jordan, Israel	Middle East Regional Cooperation (MERC) Program: coral reef resource management and conservation	Jordanian and Israeli universities
Latin America& Caribbean		
Belize	Global Conservation Program: SEEMPS-MPAS - Gladden Spit and Silk Cayes Marine Reserve (fisheries management and coral reef conservation)	TNC, Friends of Nature, Belize Spawning Aggregation Working Group, Belize Fisheries Department
Belize	Global Conservation Program: Glover's Reef Living Seascape: Safeguarding Marine Resources and Rural Livelihoods in Belize	WCS, Glovers Reef Advisory Committee, Belize Fisheries Department, Friends of Nature
Ecuador	Sustaining Coastal Communities and Ecosystems (SUCCESS): Cojimies Estuary (mangrove conservation as critical fish habitat; sustainable aquaculture)	Coastal Resources Center Univ. Rhode Island, Univ. Hawai`i at Hilo, local communities
Guatemala	Global Conservation Program - SEEMPS-MPAS: Meso-American Regional Progam (identification and conservation of Nassua grouper spwaning aggregation sites)	TNC, Friends of Nature, Spawning Aggregation Working Group)

Honduras	Global Conservation Program: SEEMPS-MPAS -- Cayos Cochinos National Monument (fisheries management and coral reef conservation)	TNC, Committee for the Management of Cayos Cochinos, HCRF, Ministry SERNA
Honduras	Integrated Protection and Management of Environmental Resources (MIRA): lobster fishery assessment and management	International Resources Group, local partners, local and national government, universities
Mexico	Global Conservation Program: SEEMPS-MPAS - Sian Ka'an Reserve (fisheries management and coral reef conservation)	TNC, Amigos de Sian Ka'an, reserve officials, CONANP
Regional Program in Central America and Mexico	Global Conservation Program - Meso-American Reef Program: SEEMPS-MPAS - Mexico, Belize, Guatemala, Honduras. (Fish spawaing aggregations sites; hydrodynamic modeling of currents and larval transport; virtual learning center for managers; whale shark tourism management.)	TNC, Univ. Miami, Tecnológico de Monterrey, Univ. for International Cooperation in Costa Rica, Friends of Nature, WCS
Central American - Dominican Republic Free Trade Agreement	Improve Fisheries Regulation, Management and Enforcement; Protect Endangered Marine Sea Turtles through improved use of Turtle Excluder Devices and reduced turtle by-catch in longline fishing. Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Dominican Republic.	NOAA, WWF, Fisheries Ministries/Departments, private sector

Resources Available

Funding

All USAID financial and technical assistance is allocated internationally and thus not available to USCRTF jurisdictions.

Training/Workshops

Population, Health and Environment Basics – An E-Learning Course

This free on-line course, which takes approximately 2.5 hours, links population, environment and development. The course offers an insider's view of 1) the basics of integrated PHE programming; 2) successful PHE programs from around the world; and 3) tools and resources that can help you develop integrated programs. Available at http://www.globalhealthlearning.org/ (free registration required). Once logged-in, choose "Population, Health, and Environment Basics" from the Course List.

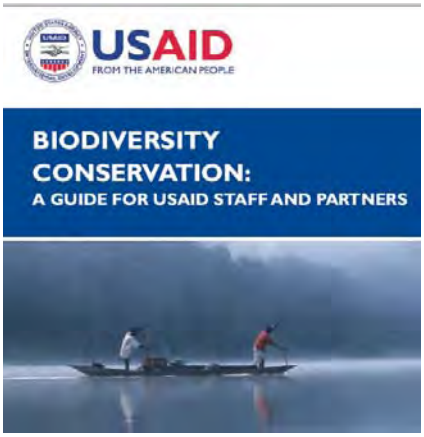
Publications and Documents

The following is a partial list of documents produced by USAID that relate to coral reefs or environmental programs implementation and evaluation.

Lessons Learned and Best Practices in the Management of Coral Reefs

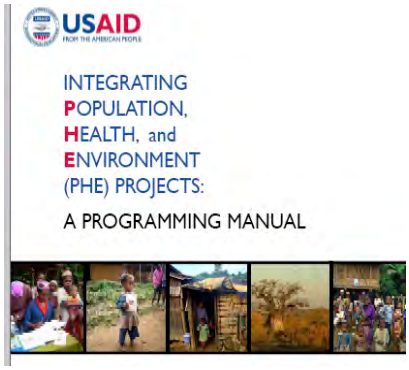
This WorldFish publication, supported by USAID, presents a review of lessons learned and best practices in the management of coral reefs based on the analysis of 30 projects funded by the Global Environment

Facility (GEF) related to coral reefs and associated tropical marine ecosystems and 26 non-GEF funded projects. The key lessons learned and recommendations are grouped according to eight priority issues in coral reef management.
http://www.worldfishcenter.org/resource_centre/LessonsLearned1804%20-%20FINAL.pdf



USAID Biodiversity Conservation Guide
This guide provides basic information about designing, managing, and implementing biodiversity conservation programs or activities. The guide is intended for a broad audience including USAID mission and Washington staff, implementing partners, and multiple stakeholders within and across sectors. This extensive document (over 200 pages) contains sections that are particularly relevant to coral reef-related projects, such as marine protected areas, community-based conservation, fisheries, and others.
http://rmportal.net/tools/biodiversity-conservation-tools/biod-guide-2005/

A Programming Manual: Integrating Population, Health and Environment Projects



Achieving environmentally-sustainable development in situations of surging population growth, declining biodiversity, and chronic poverty requires strategic planning, multi-disciplinary interventions and cross-sector linked approaches that mirror the livelihood strategies of poor households and communities. This manual was designed with such a need in mind using evidence from programs in Madagascar, the Philippines and other countries where integrated approaches to development have been explored and brought to scale over the past decade. Download a PDF of the guide at:
http://www.ehproject.org/PDF/phe/phe-usaid_programming_manual2007.pdf

A Guide for Monitoring and Evaluating Population, Health and Environment Programs:
This guide provides a series of established and evidence-based indicators for measuring progress and promoting evaluation of PHE programs in the field. Within the manual, indicators are grouped into five programmatic areas of importance: population; health; environment; integration; and value added. Each indicator includes a clear definition; measurement level; calculation; statement of purpose; data sources; time frame; data collection considerations and strengths and weaknesses. The guide is intended to provide a selection of indicators that are applicable throughout the diverse PHE community. The goal is that utilization of these key indicators will provide common language, reliable information, and quality data that will enable the PHE community to compare and assess projects across communities, countries, and program areas. The guide is available at: http://www.cpc.unc.edu/measure/publications/pdf/ms-07-25.pdf

U. S. Coast Guard

Maritime safety, security, and stewardship are enduring roles of the United States Coast Guard. These roles reflect long-standing responsibilities which are interrelated such that they can best be accomplished by a single military, multi-mission, maritime force. As such, the Coast Guard possesses a unique blend of humanitarian, law enforcement, regulatory, diplomatic and military capabilities. The Coast Guard protects the vital economic and security interests of the United States including the safety and security of the maritime public, our natural resources and the value inherent in them, the global transportation system, and the integrity of our maritime borders. Accordingly, the Coast Guard strives to eliminate environmental damage and natural resource degradation associated with maritime activities, including but not limited to maritime transportation, commercial fishing, and recreational boating. USGS advances these national interests through the 3.4 million square miles of the U.S Exclusive Economic Zone, along our country's 95,000 miles of shoreline, throughout the high seas, and with international partners abroad.

The Coast Guard's multi-mission character is defined by its ability to conduct distinct yet complementary functions in the maritime domain – law enforcement, national defense, mobility, maritime safety, environmental protection, and humanitarian response. The Coast Guard enforces laws designed to sustain our nation's fisheries, protect marine mammals and endangered species, and conserve the marine environment. In addition, the Coast Guard actively promotes pollution prevention and response preparedness, reduces the harmful effects of marine debris, enforces laws prohibiting the discharge of oil and the release of hazardous substances, and strives to help stem the introduction of non-indigenous invasive species into the navigable waters of the United States. The Coast Guard develops regulations and enforces laws and international safety, security, and environmental conventions to ensure the safety of fishing vessels, recreational boats, commercial passenger, freight and tank vessels, and the maritime transportation system through focused prevention, compliance and inspection programs, search-and-rescue, and casualty investigation. The Coast Guard carries out waterways management activities to ensure the safe and efficient use of our navigable waterways for domestic commerce, international trade, recreational use, national defense, and environmental protection. The Coast Guard also serves as America's voice to the International Maritime Organization (IMO), addressing maritime issues of a global nature.

The Coast Guard is not an implementing agency under the Coral Reef Protection Executive Order 13089, nonetheless, it has a role in coordinating with other agencies and conducting its missions to help achieve coral reef protection and conservation. The Coast Guard applies its multi-mission capabilities to support other agencies efforts to implement measures necessary to research, monitor, manage, and restore coral reef ecosystems. These capabilities are summarized in the following mission statements.

Marine Environmental Protection Mission Statement

The Coast Guard's Marine Environmental Protection (MEP) mission protects the marine environment by averting the introduction of invasive species, stopping unauthorized ocean dumping, and preventing the discharge of oil or hazardous substances entering U.S. and international waterways. The Coast Guard accomplishes this mission through its prevention and

response service delivery processes. The Coast Guard develops regulations and operating standards for domestic vessels and marine facilities; represents the U.S. at the International Maritime Organization as an advocate for responsible international environmental and operational standards; and Coast Guard personnel stationed around the country enforce standards by conducting periodic inspections and boardings. When accidents do happen, the Coast Guard responds in partnership with other federal agencies, state and local governments and the maritime industry to ensure the impacts of a spill are minimized.

Living Marine Resource Law Enforcement Mission Statement

The Coast Guard's Living Marine Resources (LMR) Law Enforcement program provides security of the United States' Exclusive Economic Zone (EEZ) from foreign fishing vessel incursions and protection of our living marine resources to advance national strategies and goals. As the lead maritime federal law enforcement agency, USCG provides effective presence and professional at-sea enforcement for the conservation and management of living marine resources and their environments, to include protected species and critical habitats. In addition, the Coast Guard partners to both coordinate its operations and support U.S. Government efforts to build capacity of like-minded nations to monitor compliance with various international agreements and to deter damaging Illegal, Unreported, and Unregulated (IUU) fishing activity.

Marine Environmental Response Program Statement

The mission of the Coast Guard's Marine Environmental Response (MER) program is to ensure the highest quality of marine environmental response operations for oil and hazardous substance within the United States, along our bordering waters, and overseas in support of national defense and foreign policy objectives.

Waterways Management Mission Statement

The Coast Guard's Waterways Management (WWM) program works in concert with other federal agencies, state and local governments, marine industries, maritime associations, and the international community to optimize use and champion development of the nation's marine transportation system.

Authorities and Mandates

The Coast Guard operates under a number of authorities and the agency's operations, internal policies, directives and instructions address the requirements of a suite of laws, regulations, treaties, conventions, Executive Orders and Presidential Proclamations.

A sample of authorities granted to the Coast Guard with a nexus to coral reef protection include:

14 U.S.C. 2 establishes the Coast Guard's broad, multifaceted jurisdictional authority, and serves as the statutory basis for all enforcement activities. It reads, in part:

The Coast Guard shall enforce or assist in the enforcement of all applicable federal laws on, under or over the high seas and waters subject to the jurisdiction of the United States.

14 U.S.C. 89 authorizes the Coast Guard to make inquiries, examinations, inspections, searches, seizures, and arrests upon the high seas and waters over which the United States has jurisdiction,

for the prevention, detection, investigation and interdiction of violations of laws of the United States.

Magnuson-Stevens Fishery Conservation & Management Act

Under the Magnuson-Stevens Act (16 U.S.C. §1801), the Coast Guard is charged with protecting the U.S. Exclusive Economic Zone, which is the world's largest, from unlawful incursions by foreign vessels. The Coast Guard also enforces, in partnership with NOAA Fisheries, U.S. domestic fisheries regulations developed by regional Fishery Management Councils and promulgated by the Secretary of Commerce. In addition, the Coast Guard works closely with the Department of State and the National Marine Fisheries Service to enforce international living marine resource agreements.

National Marine Sanctuaries Act (16 U.S.C. § 1826a-1826c)

Coast Guard operations support the implementation of the National Marine Sanctuaries Act which provides for the designation of discrete areas of the marine environment to promote comprehensive management of the nation's unique ecological, historical, recreational, and aesthetic marine characteristics.

Ports and Waterways Safety Act (33 USC 1221-1232)

With the passage of this Act, Congress reiterated that navigation and vessel safety, protection of the marine environment, and safety and security of United States ports and waterways are matters of major national importance. The Act establishes the role of the Coast Guard to protect these interests.

National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300)

The Coast Guard holds positions as vice chair for the National Response Team and co-chair of the Regional Response Teams which implement the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This plan establishes a framework for responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

Safety of Life in Navigable Waters (33 CFR 100)

The Coast Guard maintains regulations under 33 CFR to provide effective control over regattas and marine parades conducted on the navigable waters of the United States so as to insure safety of life in the regatta or marine parade area. The permitting of marine events under these regulations takes into account marine environmental issues such as adverse impacts to coral reefs.

Coral Reef Protection Implementation Plan

The Coast Guard's Coral Reef Protection Implementation Plan is established by Commandant Instruction 1600.2. The Implementation Plan outlines procedures to ensure that Coast Guard operations do not themselves adversely affect coral reef systems. As part of the Implementation Plan, District Commanders work with regional offices of NOAA's National Marine Fisheries Service, National Marine Sanctuaries Offices and regional Fishery Management Councils to determine coral-focused enforcement priorities and develop coral-focused enforcement

operations. In addition, Coast Guard Aids-to-Navigation and Waterway Management activities are cognizant of the need to ensure that coral reefs are protected from damage. The Implementation Plan also incorporates a requirement that Coast Guard permitting of marine events consider the effects of proposed events on nearby coral reefs. Finally, an emphasis is relayed to Coast Guard Operational Commanders to allocate resource hours, subject to availability of funds and considering all mission priorities, for enforcement of regional fishery management regulations in coral reef areas. The Coast Guard's Coral Reef Protection Implementation Plan is available on the Coral Reef Task Force website.

Regional and Local Liaison with Coral Reef Managers

Detailed planning for coral reef protection and conservation measures is often performed at the local level. Further, it is likely that regional or local bodies will be best equipped to advise on local coral reef issues and to coordinate Coast Guard actions at the field level. Accordingly, District Commander staffs in the Seventh, Eighth and Fourteenth Districts are charged with ensuring the Coast Guard is appropriately involved with regional and local coral reef advisory or management coordination bodies.

Marine Event Permitting

Under Title 33 Code of Federal Regulations Part 100, the Coast Guard issues permits for organized marine events such as regattas, marine parades, and power boat races after determining that the event can be conducted without unacceptable adverse safety risks or environmental impacts. Potential impacts of proposed marine events on coral reefs are considered by field units that issue such permits.

Organizational Structure

The Coast Guard's operational model is flexible, efficient, and effective across a wide range of complex maritime scenarios. To implement this operational model, the Coast Guard relies on a delegated command structure, ensuring that adequate authority is vested in the local and regional commands that are most able to tailor the deployment of Coast Guard resources to meet specific threats and address particular vulnerabilities. The Service's command structure recognizes the importance of responsiveness to local and regional priorities within the context of national interests.

Coast Guard Headquarters in Washington D.C. accomplishes strategic work that supports effective field operations including the development of Service doctrine, policy and strategy. Within Coast Guard Headquarters, the Assistant Commandant for Maritime Safety, Security, and Stewardship (CG-5) represents the Coast Guard on the Coral Reef Task Force.

Two commands, the Pacific Area Command for the Pacific region and Atlantic Area Command for the Atlantic and Gulf of Mexico manage Coast Guard activities in both a regional and operational context. Pacific and Atlantic Area Commanders oversee Coast Guard mission effectiveness and coordinate the deployment of the Service's major cutters to project a strong presence in respective maritime regions. Area Commanders are supported by multiple District Commanders who deploy aircraft and boats in coordination with major cutter deployments. In

addition, District Commanders employ additional Coast Guard resources to ensure mission effectiveness across the Service's maritime security, safety, and stewardship roles.

U.S. Coast Guard Areas and Districts

The Coast Guard Districts with adjacent tropical coral reef ecosystems include; Districts Seven and Eight encompassing U.S. waters of the Southeast United States, Gulf of Mexico, and Caribbean, and District Fourteen, which encompasses U.S. waters surrounding Hawaii and the U.S. Commonwealth, territories and possessions in the Western and Central Pacific.

Programs and Activities

The Coast Guard performs missions and has regulatory responsibilities that address a number of the threats to and management of coral reefs. These include waterways management including maintaining aids to navigation, regulation of anchorages and vessel routing, living marine resources law enforcement, pollution and hazardous material spill response, and mitigation of the introduction of aquatic invasive species. As the U.S. representative at IMO, the Coast Guard is also engaged in international efforts to protect coral reefs from maritime activities.

Living Marine Resources Law Enforcement Division

Within Coast Guard Headquarters, the Office of Law Enforcement Policy's (CG-531) Living Marine Resources Law Enforcement Division (CG-5314) coordinates Coast Guard Program involvement. In addition, this office serves as the Coast Guard's Program Manager for the Coast Guard's Living Marine Resources Law Enforcement Program. Ocean Guardian is the Coast Guard's long-range strategy to provide effective and professional at-sea enforcement to

advance national goals for the conservation and management of living marine resources and their environment. Ocean Guardian provides a framework for the Coast Guard's work with NOAA and with the State Department to ensure an integrated national strategy for fisheries enforcement. It also provides a framework for the Coast Guard to help the nation recover and maintain healthy populations of marine protected species. Ocean Guardian is publicly available at: http://www.uscg.mil/hq/cg5/cg531/LMR.asp.

a. **Fisheries and Marine Protected Species Law Enforcement.** It is reasonable to expect that coral reef resources will move under Regional Fisheries Management plans over the next several years and that restrictions on fishing activities will increase on or near coral reefs. Coast Guard resources conduct enforcement operations for such restrictions as part of the Service's overall maritime law enforcement effort.

b. **Marine Protected Area (MPA) Enforcement.** A "Marine Protected Area" is a collective term used to describe a number of different approaches to geographic based area protection. For remote marine protected areas, such as the Papahānaumokuākea Marine National Monument in the Northwest Hawaiian Island Chain and the coral reefs protected within the Monument's boundaries, long-range Coast Guard assets are the logical and appropriate platform for monitoring, surveillance and enforcement. The Coast Guard coordinates and prioritizes enforcement actions for remote marine protected areas with the National Marine Fisheries Service and other stakeholders to ensure that the Coast Guard's limited long range enforcement assets are deployed to best effect.

c. **Cooperative Domestic Law Enforcement Efforts.** As marine protected areas are developed that incorporate management principles resulting in Marine Sanctuaries, fishery reserves, restricted anchoring areas, maritime traffic areas to be avoided and as other coral reef conservation measures come on-line, the Coast Guard is experiencing increased calls for at-sea enforcement patrols and cooperative involvement in coordinating among various stakeholders to achieve management conservation, protection, and utilization goals. To the extent possible within existing mission priorities and resource constraints, such requests are incorporated into mission planning and execution.

The Office of Incident Management & Preparedness

This office (CG-533) serves as Program Manager for prevention and response operations addressing maritime pollution incidents, marine accidents and other threats to public safety and the marine environment.

a. **Pollution Response Operations in Coral Reef Areas.** Pollution response operations in or near coral reef areas are conducted under the provisions of the National Contingency Plan (40 CFR 300) to maximize net environmental benefit in accordance with stakeholder input and the best science available. Consistent application of scientific principles that are part of a pre-approved decision protocol published in the Area Response Plan's sensitive area annex is far preferable to having to rely on determinations of 'best available science' made in the midst of a crisis response. Planning guidelines on environmental sensitivities, salvage and lightering operations and wreck and debris removal issues are provided to Coast Guard Captain's of the Port who

are pre-designated as Federal On-Scene Coordinators in areas where coral reefs are found.

Coast Guard Marine Debris Recovery Efforts surrounding Maro Reef and Midway Atoll in the Papahanoumokuakea Marine National Monument – U.S. Coast Guard Photo (2008)

b. **Restoration, Mitigation and Debris Removal.** In addition to the enforcement of protective regulations, the Coast Guard assists agency partners by providing assets to assist with the removal of abandoned fishing gear and other debris affecting coral reefs.

In the spring of 2008, Coast Guard Cutter WALNUT, a 225' buoy tender, participated in a marine debris removal operation in the Papahānaumokuākea Marine National Monument. Partnering with NOAA and the University of Hawaii, Coast Guard was able to remove more than 28 tons of trash from the area. The 18 day multi-agency effort included a 2,900-mile trip to Māro Reef and Midway atoll to remove as much marine debris as possible from the water surrounding the monument using the ship's crane, lift bags, and divers. This effort removed more than 510 metric tons of debris from the Northwestern Hawaiian Islands since 1996.

The Director of Prevention Policy

The Director of Prevention Policy (CG-54) develops and maintains policy, standards, and program alignment for the prevention activities of the Coast Guard to achieve Marine Safety, Security, and Stewardship mission success. As the nation's lead agency for waterways management, port safety and security, and vessel safety inspection and certification, the Coast Guard maintains a continuous and clear focus not only on the prevention of marine accidents but also on the response measures needed to cope with manmade and natural disasters. The Coast Guard also is responsible for maintaining and patrolling the safe and efficient navigable waterways system needed to support domestic commerce, facilitate international trade, and ensure the continued availability of the military sealift fleet required for national defense. A safe and efficient navigable waterway also protects the marine environment, especially sensitive or protected elements such as coral reef systems.

Under the Director of Prevention Policy, the Office of Waterways Management (CG-541) develops policy and oversees multi-program alignment in the pursuit of a safe, secure, efficient and environmentally sound waterways system.

a. **Navigation Safety & Traffic Management.** As the designated lead representative for the United States on maritime safety and marine environmental protection issues, the Coast Guard works through the Safety of Navigation Sub-Committee of the International Maritime Organization (IMO) to improve navigational performance and technical standards embodied in the International Convention for the Safety of Life at Sea and other IMO instruments. The Coast Guard works in concert with NOAA, through other relevant international technical standards bodies to improve navigation technology and practice. The Coast Guard also works through existing domestic statutory authority to establish appropriate vessel traffic management measures such as Traffic Separation Schemes, Regulated Navigation Areas, No Anchoring Zones, establishment of Anchorages.

b. **Aids to Navigation (ATON) Program.** Navigational aids have long been erected on (fixed aids) or placed near (floating aids) coral reefs in order to warn mariners of navigational hazards or to define safe passages through the reef systems. While the impetus to deploy aids to navigation in coral areas was not originally motivated by a desire to protect the reefs per se, significant protection for the reefs has been an important additional benefit of providing navigational assistance to vessels transiting nearby. District Commanders whose areas of responsibility include coral reefs evaluate existing aid systems near coral reefs for adequacy. The evaluations are conducted in consultation with designated Resource Trustees, if any, and other concerned local stakeholders, and consider all available data on vessel casualties and other pertinent factors.

c. **Anchorage Management.** Under the Ports and Waterways Safety Act and other authorities, the Coast Guard can establish anchorages of several types to promote safety and protect the environment while also meeting the needs of commerce. District Commanders periodically survey anchoring regulations and to identify any needed improvements to Coast Guard anchorage regulations and to develop appropriate anchorage management practices and divisions of labor between the Coast Guard, other federal agencies and state authorities. To the degree that maritime anchorages exist in and around coral reef habitats, interested coral stakeholders and resource trustees are highly encouraged to coordinate their management goals and objectives with the Coast Guard.

d. **Creation of Mooring Fields.** Permanent moorings have been used to good effect in preventing anchor damage to reefs frequented by recreational divers and fishers. To be effective, permanent moorings generally require regulations mandating the use of permanent moorings within designated areas and prohibiting nearby normal anchoring. Coast Guard operational assets may be available, on a not-to-interfere basis and pursuant to a properly executed Memorandum of Agreement (MOA), to help install or maintain permanent mooring fields established by other government agencies. In addition it is useful to facilitate cooperative and coordinated enforcement efforts supporting mandatory mooring fields.

Under the Director of Prevention Policy, the Office of Boating Safety and Auxiliary (CG-542) is dedicated to improving the knowledge, skills, and abilities of boaters as well as coordinating with the Coast Guard Auxiliary, a uniformed volunteer force that donate thousands of hours in support of Coast Guard missions.

Public Education and Outreach

In many areas, careless or inattentive operation of recreational and commercial vessels is a significant threat to coral reef health. The Coast Guard, through its Sea Partners and Commercial Fishing Vessel Safety Programs and also through its boating safety educational efforts, helps to educate the boating public and commercial marine operators to address various hazards. Coral reef conservation and protection information is included in recreational boating safety courses taught by the Coast Guard Auxiliary, coral reef preservation handouts are distributed to students in appropriate areas, and Coast Guard personnel interact directly with the boating public at public events.

In 2008, the Coast Guard's Marine Environmental Protection outreach & education program, Sea Partners, was very active. In 2008 the Sea Partners program worked with the Officer Snook Water Pollution Program to develop two new resources: a "Prevent Pollution on Coral Reefs" publication for school students and the "Help Officer Snook Protect Coral Reefs" coloring book for children. In addition to outreach and education promoting protection of coral reefs, the Sea Partners program reaches over 300,000 people annually addressing endangered species protection, aquatic nuisance species, plastics, oil spill prevention, beach clean-ups, and illegal garbage dumping.

As part of the Commercial Regulations and Standards Directorate (CG-52), the Office of Operating & Environmental Standards (CG-522) develops national regulations and policies for marine environmental protection and influences the development of global marine environmental protection agreements to integrate U.S. and international environmental standards and public policy.

a. **Facilities Engineering and Environmental Compliance.** The Coast Guard carefully manages shore facilities in coral reef areas for conditions that could degrade nearby reefs, or reef-related ecosystems such as mangroves. Particular attention is given to oil and hazardous material storage and to potential discharges, both point and non-point sources. Future facility construction activities near coral reef areas will incorporate measures to mitigate any impacts by reducing sedimentation and discharges to the maximum extent practicable.
b. **Non-indigenous and Invasive Species Mitigation Efforts.** Non-indigenous and invasive species can be a significant threat to coral reef health. The Non-indigenous and Aquatic Nuisance Prevention and Control Act of 1990 established the Aquatic Nuisance Species Task Force (ANSTF), a multi-agency task force to deal with aquatic invasive species. The Coast Guard is a member of the ANSTF and is fully engaged in U.S. Government efforts to mitigate the introduction of non-indigenous and invasive species.
c. **Vessel Discharge Regulations.** Internationally, vessel discharges are governed by the International Convention on the Pollution of the Sea by Ships (MARPOL). Various annexes to MARPOL cover topics such as oil, garbage, and noxious liquids. The MARPOL Convention and its annexes are under the auspices of the International

Maritime Organization (IMO), a special arm of the United Nations. On the domestic front, jurisdiction over vessel discharges can be held by federal, state or local agencies depending on the class of vessel in question, the nature of the discharge and the extent of area affected by a given regulation.

International Year of the Reef

In addition to the Coast Guard's Sea Partner Program and vessel operator and public boating campaigns that stress the importance of safe navigation and minimizing marine pollution, the Coast Guard has focused on specific coral reef protection and conservation education and outreach efforts in coordination with international, national, regional, and local information campaigns.

In support of the International Year of the Reef in 2008, the Coast Guard helped sponsor the 11th International Coral Reef Symposium hosted by the United States in Fort Lauderdale, Florida. The Symposium was attended by over 3,500 people from 75 countries. One of two Coast Guard booths provided overviews of Coast Guard operational efforts such as marine debris removal, preventing and responding to coral injury events, and maritime law enforcement patrols addressing fisheries management prohibitions. The second exhibit featured the Coast Guard's Sea Partners program and included print and visual media displays regarding coral reef protection.

Coast Guard Actions That May Affect Coral Reefs

Executive Order 13089 requires that agency decisions affecting coral reefs are made with full consideration of stakeholder concerns and that actions are effectively coordinated between relevant agencies. In order to satisfy the requirement, the Coast Guard utilizes several tools:

a. Coast Guard Coral Reef Implementation Plan is available on the CRTF website.
b. The Coast Guard's Annual Performance Report to Congress includes annual activity reports on all Coast Guard statutory missions.
c. USCRTF Membership. The Coast Guard is an active member of the USCRTF, supporting work to coordinate agency activities specifically related to coral reef conservation and protection.
d. Coast Guard operations in Coral Reef areas. Internal Coast Guard navigation safety standards are incorporated into unit standing orders which provide comprehensive and effective measures for avoiding accidental groundings and other navigational mishaps by which Coast Guard cutters and boats could threaten coral reefs. Coast Guard personnel operating in or near coral reefs remain vigilant when operating around coral reef areas. As a general rule, floating units avoid operating near coral reefs to the extent possible given the requirements of the mission being undertaken. Anchoring in coral areas is also avoided. However, when exigent circumstances require a Coast Guard vessel to anchor in known coral areas, every effort is made to avoid anchoring on or near visible coral formations that could be adversely affected by the vessels hull or props, the sweep of the anchor chain, or the anchor itself.
e. Discharges from Coast Guard Vessels. The Act to Prevent Pollution from Ships (APPS) is the domestic implementing legislation for the MARPOL convention in the United States. APPS applies, in part, to public vessels, including Coast Guard vessels. Various exemptions notwithstanding, it is Coast Guard policy that our

vessels will strive to comply with all U.S. ratified MARPOL Annexes. Specifically, Coast Guard vessels either return wastes to shore or dispose of them at sea in accordance with the standards established under APPS and MARPOL.

Capacity Building & Funding Opportunities

The Pacific Area Commander coordinates the Coast Guard's participation in DOD's annual Pacific Combatant Commander's Cooperative Afloat Readiness and Awareness Training (CARAT) deployments. CARAT exercises are designed to enhance regional cooperation with Pacific Island nations and result in building stronger diplomatic ties between the United States partnering governments as well as the strengthening of professional skills on the part of all participating entities. Coast Guard CARAT activities in the past have focused on meetings with host country law enforcement, marine police and military communities and emphasized maritime security, general law enforcement training, co-operative search and rescue exercises and other forms of operational maritime cooperation. Based on host country desires, future CARAT activities may be organized to incorporate the transfer of best practices to protect coral reefs and other key environmental protection and marine stewardship initiatives.

The Coast Guard's budget, like its organizational structure, is allocated to execute operational missions. The Coast Guard is not authorized nor funded to provide grants. However, the Service often partners with other agencies and coordinates with stakeholders engaged in work supportive of or reliant upon Coast Guard missions.

U.S. Department of Agriculture

The mission of the U.S. Department of Agriculture (USDA) is to provide leadership on food, agriculture, natural resources, and related issues based on sound public policy, the best available science, and efficient management. While USDA is intrinsically a land-focused agency, the connection between land use and coral reefs makes the USDA a vital partner in reef conservation. USDA actively participates on the USCRTF via the Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS) is the Department of Agriculture's principal agency for providing conservation technical assistance to private landowners, conservation districts, Tribes, and other organizations through a national network of locally respected, technically skilled, professional conservationists.

NRCS provides products and services that enable people to be good stewards of the Nation's soil, water, and related natural resources on non-Federal lands. Through its staff of professional conservationists, NRCS delivers consistent, science-based, site-specific solutions to help private landowners voluntarily conserve, maintain, and improve the Nation's natural resource base. The USDA, and by extension, NRCS, focuses on land as the primary beneficiary of the work of the Department. Work by USDA can indirectly benefit near-shore coral reefs via direct benefits to the land.

Authorities and Mandates

The Farm Bill

The USDA operates primarily under authorization by the Farm Bill. H.R. 110-6124, the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) was recently reauthorized in June, 2008.

Organizational Structure

USDA is divided into 17 agencies, 12 offices (at the headquarters level) and 7 mission areas. The mission areas of USDA include: Farm and Foreign Agricultural Services; Food, Nutrition and Consumer Services; Food Safety; Marketing & Regulatory Programs; Research, Education & Economics; Rural Development; and Natural Resources and Environment.

Natural Resources Conservation Service (NRCS) NRCS, the USCRTF representative, is one of USDA's 17 agencies. NRCS is located under the Natural Resources and Environment mission area.

The NRCS Organization

To find contact information for local and state NRCS offices, go to: http://www.nrcs.usda.gov/about/organization/regions.html

Offices

- Headquarters Leadership

- NRCS Organizational Chart
- NRCS Regional Map
- Office of the Chief
  - Chief
  - Associate Chief
  - Strategic Natural Resource Issues
  - Public Affairs Division
  - Legislative Affairs Division
  - Civil Rights
  - Financial Management
  - State Offices
    - Local Service Centers
  - National Centers

Deputy Areas

- **Management**
  Leadership
  Contacts Directory
  FAQ's
- **Programs**
  Leadership
  Contacts Directory
  FAQ's
- **Science and Technology**
  Leadership
  Contacts Directory
  FAQ's
- **Soil Survey and Resource Assessment**
  Leadership
  Contacts Directory
  FAQ's
- **Strategic Planning and Accountability**
  Leadership
  Contacts Directory
  FAQ's

States

USDA-NRCS is a decentralized agency. NRCS has State Office, Area Office, and Field staffs in every state in the U.S. With approximately 2,500 field offices, NRCS staff are located in the majority of the counties across the Nation. In addition, NRCS has staff in the Pacific Island and Caribbean Areas.

Each state and territory has a State Technical Committee that is responsible for developing recommendations for the State Conservationist or Area Director (lead NRCS employee in the State or the Pacific Islands and Caribbean Areas) to consider with regards to the natural resource issues and concerns in that State. The State Conservationist/Area Director takes these

recommendations under advisement when making decisions about how the resources in that State will be allocated.

State Technical Committee

The Food Security Act of 1985, as amended, authorizes the State Technical Committee to provide recommendations for establishing technical guidelines and program criteria and priorities necessary to carry out conservation provisions of the Farm Bill. The committee also helps assure that civil rights requirements in program delivery are met. Additionally, the State Technical Committee provides recommendations on a number of issues within a variety of conservation programs. Although the State Technical Committee has no implementation or enforcement authority, USDA gives strong consideration to the Committees' recommendations.

State Technical Committees serve in an advisory capacity to the Natural Resources Conservation Service (NRCS) and other agencies of the USDA on the implementation of the natural resources conservation provisions of Farm Bill legislation. Committees are intended to include members from a wide variety of natural resource and agricultural interests. Chaired by the NRCS State Conservationist in each state, these Committees are composed of representatives from Federal and state natural resource agencies, American Indian Tribes, agricultural and environmental organizations, and agricultural producers.

The Committees meet regularly to provide information, analysis, and recommendations to appropriate USDA officials. Individuals or groups wanting to participate as members on a State Technical Committee may submit requests to the State Conservationist explaining their interest and relevant credentials.

The Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) made the following changes to State Technical Committees:

• Expands agricultural and forestry involvement on Committees;
• Modifies responsibilities of Committees;
• Exempts Local Working Groups from the Federal Advisory Committee Act;
• Expands State Technical Committees' authority related to reviewing Local Working Groups' efforts to address State program priorities;
• Supports standardization of Committee operations through the development and publication of standard operating procedures; and
• Reaffirms the role of the State Technical Committees as advisory in nature.

For more information about State Technical Committees and other Farm Bill topics, please refer to the State Technical Committee Web site: www.nrcs.usda.gov/programs/StateTech/

The State Technical Committee may advise the NRCS State Conservationist on many issues, such as:
• State program management policies and procedures
• Technical programmatic recommendations
• Statewide public information and outreach campaigns
• Identifying significant statewide natural resource concerns
• Guidelines for developing ranking criteria for evaluating applications
• Guidance on eligible conservation practices

• Technical guidance on conservation practices, including new, innovative practices
• Cost-share rates and incentive payment limits and methods of payment
• Identifying, monitoring, and analyzing performance indicators
• Evaluating and reporting program impacts on natural resources and the environment
• Coordinating with other Federal, State, tribal, and local public and private activities

To work with USDA NRCS, state agencies and organizations should find the local USDA Service Center. Many USDA Service Centers are designed to be a single location where customers can access the services provided by the Farm Service Agency, Natural Resources Conservation Service, and the Rural Development agencies, and can be located at: http://offices.sc.egov.usda.gov/locator/app

Note: Guam USDA Service Center also serves American Samoa, Federated States of Micronesia, Palau, Marshall Islands and Mariana Islands.

Programs & Projects

USDA programs are designed for the primary function of achieving improvements in land use practices and conservation. The secondary benefits from success in these areas are many, including better water quality conditions for some coral reefs. More information on USDA programs can be found at: www.nrcs.usda.gov/programs/farmbill/2008

The Environmental Quality Incentives Program (EQIP)

A voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP has the largest funds of all USDA conservation programs and offers financial and technical help to assist participants install or implement structural and management practices on eligible agricultural land. NRCS, working through the 2002 Farm Bill, made $30 million available for application to land-based conservation efforts within the Pacific Islands Area through the Environmental Quality Incentives Program.

Wetlands Reserve Program (WRP)

The Wetlands Reserve Program is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The USDA NRCS provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Conservation Effects Assessment Project (CEAP)

CEAP is a multi-agency effort headed by the USDA to quantify environmental effects and benefits of conservation practices. CEAP began in 2003 as a multi-agency effort to quantify the environmental benefits of conservation practices used by private landowners participating in selected U.S. Department of Agriculture (USDA) conservation programs. The project consists

of three components: National Assessment, Watershed Assessment Studies, and Bibliographies and Literature Reviews.
http://www.nrcs.usda.gov/TECHNICAL/NRI/ceap/index.html

Wildlife Habitat Incentives (WHIP)
WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP, USDA - NRCS provides both technical and financial assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed. WHIP has proven to be a highly effective and widely accepted program across the country. By targeting wildlife habitat projects on all lands and aquatic areas, WHIP provides assistance to conservation minded landowners.

The Conservation Technical Assistance Program (CTA)
CTA is a voluntary program that provides technical assistance, supported by science-based technology and tools, to farmers, ranchers and other conservation partners to help conserve, maintain, and improve their natural resources. The CTA Program is the foundation of NRCS conservation technical assistance and serves to focus on natural resource issues at the local level that are of local, State, multi-state, and national concern. The CTA Program works in partnership with locally led decision-making processes and other conservation programs to address national priorities in concert with local and State needs. The CTA Program is the foundation for the NRCS conservation assistance infrastructure and brings to bear the technical expertise to much of the Nation's private lands and Tribal lands to get sound conservation solutions applied on the ground.

The voluntary program is delivered to private individuals, groups of decision makers, Tribal governments, local units of governments, and non-governmental organizations, the District of Columbia, Puerto Rico, U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, the Republic of Palau, and the Marshall Islands.
http://www.nrcs.usda.gov/programs/cta/

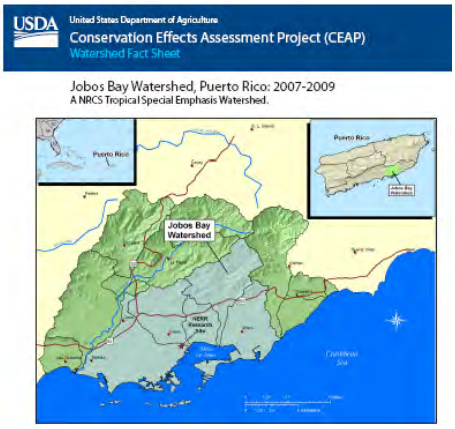
Emergency Watershed Program (EWP)
The purpose of the EWP program is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.
http://www.nrcs.usda.gov/programs/EWP/

Florida

The Emergency Watershed Program
The program helped local communities remove household and construction debris as well as vegetative refuse that was deposited in the waters after three hurricanes (Charley, Frances, and Jeanne) struck South Florida in September and October 2004. These hurricanes left over 125,000 tons of debris in 1,668 miles (2,684 kilometers) of rivers, streams, canals, and

waterways. The debris removal effort prevented much of this material from moving downstream and offshore onto coral reef ecosystems.
http://www.fl.nrcs.usda.gov/

Caribbean Area



Jobos Bay Special Emphasis Watershed Study

A Conservation Effects Assessment Project (CEAP) located in south-central Puerto Rico, the Jobos Bay Watershed study was initiated by USDA and NOAA to enhance collaborative partnerships through the USCRTF. The project began in FY 2007 and is expected to run through FY 2009. The main objective of the study is to determine the environmental effects of upland agricultural conservation practices on coastal ecosystems in tropical habitats.

As the first Special Emphasis Watershed established in the tropics, the Jobos Bay project has formed a collaborative partnership to highlight interactions between upland and coastal ecosystems and address spatially complex natural resource issues in coastal environments. USDA is conducting field surveys and assisting landowners with the application of conservation practices, while NOAA is completing Summit to Sea modeling, and providing maps and GIS data. NRCS serves as the lead coordinating agency, and is working with local organizations in the implementation portion of the project. The Jobos Bay Special Emphasis Watershed fact sheet can be found at:
http://www.nrcs.usda.gov/programs/coral_reef/Jobos_Bay_(CEAPFact)02-15-08.pdf

Pacific Islands Area

Through the 2002 Farm Bill - Environmental Quality Incentives Program (EQIP), NRCS made available $30 million for the application of land-based conservation efforts within the Pacific Islands Area. In the Pacific Islands, NRCS obligated 369 EQIP contracts from FY 2004-2006, targeting over 63,000 acres (255 square kilometers) for land-based conservation treatment. Many Pacific Island jurisdictions are impacted from agricultural swine production facilities. Working with local partners in Commonwealth of the Northern Mariana Islands CNMI, Guam, American Samoa, Palau, and the Federated States of Micronesia FSM, USDA and EPA have implemented demonstration projects for alternate waste management systems for piggeries. Dry litter waste systems and portable pen systems eliminate the use of water needed to remove waste. The dry litter waste systems not only reduce the risk of the disease leptospirosis to humans, but also reduce nutrient loading to coral reefs. This project has been extremely effective in reducing pollution. Specific to American Samoa, the government has encouraged farmers to move piggeries away from streams, which has resulted in decreased bacteria counts in the near-shore waters adjacent to the outflows of those streams. Information on this and other USDA projects in the Pacific region can be found at: http://www.hi.nrcs.usda.gov/

Resources Available

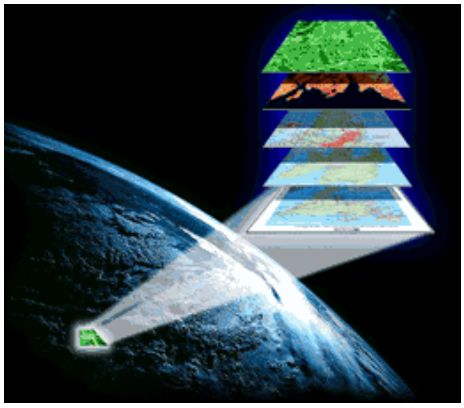
USDA has assisted states, territories, jurisdictions and Freely Associated States members of the USCRTF in the implementation of the USCRTF - Local Action Strategies. These LAS serve as one vehicle for members to implement conservation strategies developed by the Task Force. Key tasks within the conservation strategies include reduction in non-point pollution and modifications in coastal development.

Technical Assistance

Field Office Technical Guides

NRCS Technical Guides are the primary scientific references for NRCS. They contain technical information about the conservation of soil, water, air, and related plant and animal resources. The standards and specifications developed for the application of conservation practices, which are kept in the Field Office Technical Guide, apply specifically to the geographic area for where they are to be implemented. The Field Office Technical Guides (FOTGs) are available electronically as eFOTGs at http://www.nrcs.usda.gov/Technical/efotg/

Each State eFOTG has area-specific content presented within five sections:
Section I: General references
Section II: Soil and site information
Section III: Conservation management systems
Section IV: Practice standards and specifications
Section V: Conservation efforts



High resolution geographical maps, watershed, cultural resources and protected species listings can be found in Section I of the eFOTG. The Hawai`i eFOTG contains additional information on the Pacific basin, including high quality maps of Guam, Truk, Palau, Yap, among other areas (Section I, C3).

Maps, Imagery, Data & Analysis

The NRCS website contains additional resource information including databases on soil, water and climate. The site also has links to the National Resource Inventory database, the National Cartography and Geospatial Center and the Geospatial Data Gateway – providing one-stop shopping for natural resources or environmental data at anytime, from anywhere, to anyone. These resources can be accessed from this link:
http://www.nrcs.usda.gov/technical/maps.html

Funding Opportunities

The majority of the NRCS financial assistance funds are available to eligible private individuals through State allocations. State Conservationists review State Technical Committee recommendations for their respective locality, and award the funds based on Farm Bill program

applications and the State Conservationists' needs assessments. USDA funding opportunities in addition to those mentioned in the "Programs" section above include the following:

CSREES National Research Initiative

The National Research Initiative Competitive Grants Program (NRI) at the Cooperative State Research, Education and Extension Service (CSREES) is charged with funding research, education, and extension activities to address key problems of national and regional importance in biological, environmental, physical, and social sciences relevant to agriculture, food, the environment, and communities on a peer-reviewed, competitive basis.
http://www.csrees.usda.gov/funding/nri/nri.html

Pacific Islands Conservation Security Program

The Conservation Security Program is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands.

Conservation Innovation Grants (CIG)

CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-Federal governmental or non-governmental organizations, Tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns.

USDA - Rural Development Agency

The Rural Development Agency's financial programs support essential public facilities and services. Many of the efforts funded are water-related, including water treatment and water quality projects. Rural Development funds promote economic development by supporting loans to businesses, and offers technical assistance to help agricultural and other cooperatives improve their services. From FY 2001 to 2008, Rural Development has obligated over $111 billion to States and Puerto Rico for rural development projects. http://www.rurdev.usda.gov/

Publications and Documents

Electronic Field Office Technical Guides

Described in technical assistance section.

Hawai`i's Local Action Strategy to Address Land-Based Pollution Threats to Coral Reefs
(Developed in conjunction with the state of Hawai`i, EPA, NOAA, and others). This document details threats to coral reefs specific to Hawai`i, and lists proposed and ongoing actions on an island-by-island basis (83 pages).
http://hawaii.gov/health/environmental/water/cleanwater/prc/pdf/LAS.CR-LBP_fnl_3-22-04.pdf

Department of Defense - Navy

The mission of the Department of Defense (DoD) is to provide the military forces needed to deter war and to protect the security of our country.

From ridge to reef, the DoD manages a variety of terrestrial, freshwater and marine locations which are held in trust in support of its mission. The DoD mission requires continuous and evolving training to achieve the goals of *A Cooperative Strategy for 21st Century Seapower*, the new Maritime Strategy of the United States Navy, Marine Corps, and Coast Guard. While DoD is focused on achieving its military goals, it recognizes the connection between sound resource management and continuing access to natural areas for training. Militarily authorized, funded, or carried out actions are designed minimize alterations of ecosystems.

Military resource stewardship programs and facility management plans have resulted in many DoD facilities becoming islands of undeveloped habitat, even *de facto* reserves for a wide array of species and ecosystems, including commercially and ecologically vital coral reefs.

All of the DoD is a member of the U.S. Coral Reef Task Force, represented through its Executive Agent, the Office of the Assistant Secretary of the Navy for Installations and Environment (ASN(I&E)). The Army Corps of Engineers is independently represented on the U.S. Coral Reef Task Force as a civilian regulatory agency. The Coast Guard, which functions as a specialized Service under the Navy in time of war or when directed by the President, is also independently represented on the U.S. Coral Reef Task Force.

Authorities

DoD is authorized to manage natural resources on property under its control. Major drivers for natural resource management are federal laws such as the Sikes Act, Clean Water Act, Clean Air Act, Marine Mammal Protection Act, Endangered Species Act, and various Executive Orders including Executive Order 13089 for Coral Reef Protection. DoD recognizes that coral reefs are resources which require special protection in internal policy, directive and instruction.

Policies

The DoD and the Military Services manage natural resources under authority of the Sikes Act and also have trustee responsibility for those resources. The Military Services are charged by DoD Instruction 4715.3 “Natural Resources Conservation Program” to sustain access for military training and testing at DoD facilities while ensuring that the natural and cultural resources under their care are preserved for future generations. To accomplish this far-reaching goal requires substantial planning, programming, and budgeting to maintain compliance with all applicable laws and regulations.

Organizational Structure

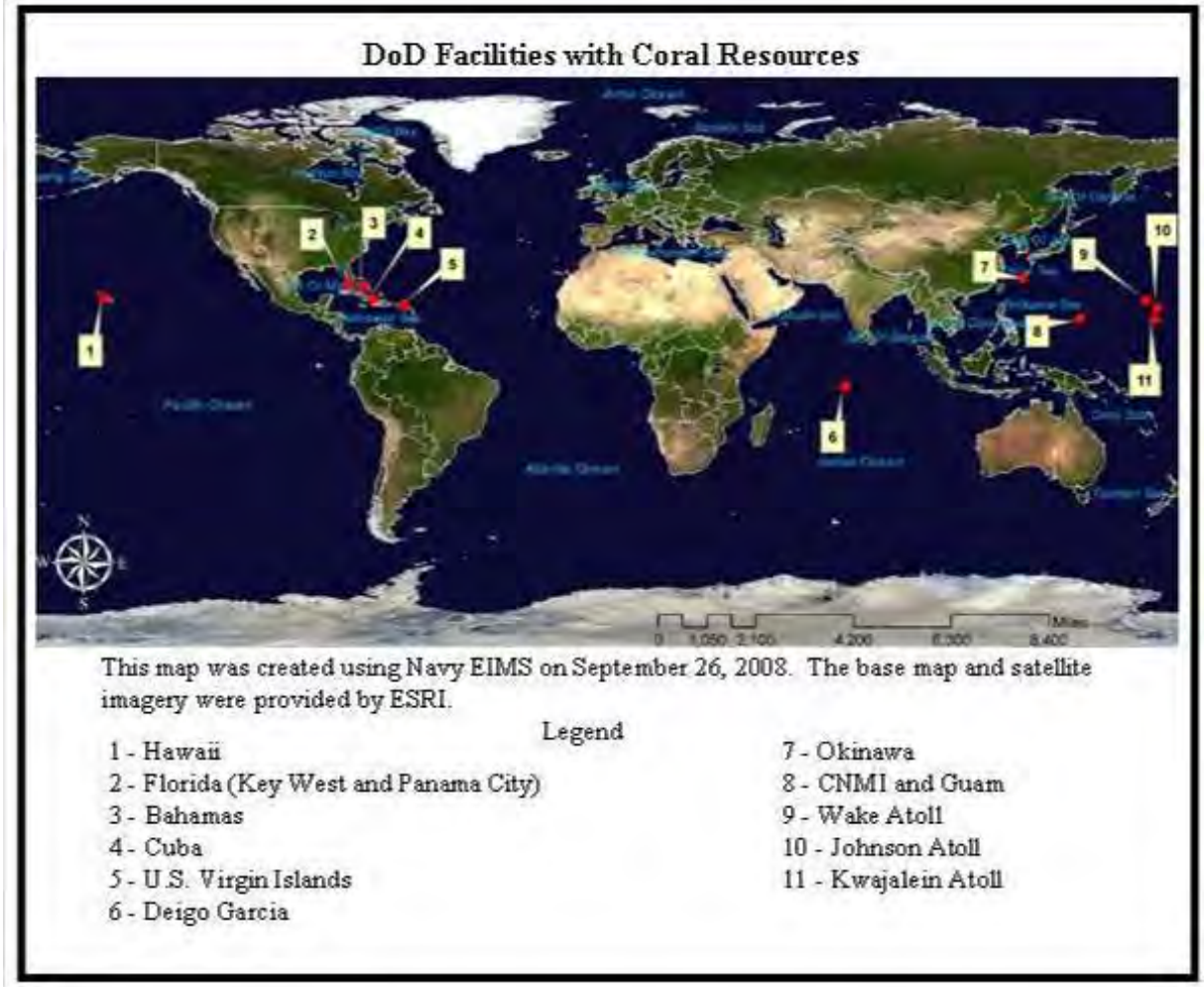
The DoD is made up of a number of component organizations including the four Military Services: Air Force, Army, Navy, and Marine Corps. Each Service owns, leases and manages a variety of developed and undeveloped locations required to support its mission. In some cases, a location may be in use by agreement with a foreign government. Each facility is managed by a regional team of civilian and military staff. Most DoD locations directly affecting coral reefs are managed by the Navy.

Locations

DoD is one of the world’s largest “landlords” with a physical plant consisting of more than 571,200 facilities (buildings, structures and utilities) located on more than 3,700 sites, on nearly 30 million acres. DoD maintains military installations in the vicinity of coral reef ecosystems around the globe including locations around Hawaii, Commonwealth of Northern Marianas Islands, Guam, Wake Atoll, Kwajalein Atoll, and Okinawa in the Pacific Ocean; Key West and Panama City, Florida, the Bahamas, Cuba, and the U.S. Virgin Islands in the Atlantic/Caribbean Ocean; and, Diego Garcia in the Indian Ocean.

Because military lands and waters are often protected from human exploitation, they include some of the Nation’s most significant natural resources. The Sikes Act, as amended in 1997, requires that military installations develop and implement Integrated Natural Resources Management Plans or INRMPs to manage these assets. INRMPs provide for a comprehensive approach to ecosystem management by integrating natural resources management for land and water resources. The management of natural resources on an ecosystem basis prevents and reduces impacts to ocean and coastal resources.

As a direct result of military conservation efforts, several former DoD sites are now managed by other agencies as reserves. These management transfers include sites on Vieques Island in the Caribbean, and Kingman Reef and Palmyra Atoll in the Pacific.



Programs and Projects

DoD prepared its Coral Reef Protection Implementation Plan to guide decision making for Department-wide coral reef conservation programs. Accomplishments made under this Plan are presented at each U.S. Coral Reef Task Force meeting, and a complete listing of programs and accomplishments is available upon request. A strategic plan to support prioritizing and funding facility-based coral reef conservation projects is currently being developed. In addition, a number of Department-wide programs which apply to stewardship of natural resources contribute to the overall reduction in DoD impacts to coral reefs.

Resource Stewardship Programs

Each Service has an array of programs for managing natural resources, tailored to the types of impacts common to the activities of that Service. Examples of stewardship programs that most directly aid coral reef ecosystems are given below.

DoD Natural Resources Conservation Program. Resource management and protection is integrated into all aspects of DoD operations from weapon system design to facility operations. A major tool for balancing resource management with mission requirements is the INRMP.

DoD facility commanders develop a site-specific INRMP for each terrestrial installation, assessing the status of natural resources and establishing guidelines for continued use and development of the installation while managing resources. While INRMPs do not specifically apply to marine resources, sound land use planning and resource management on shore can have a strong beneficial effect for near-shore resources as well.

Pollution Prevention (P2) Programs. P2 programs are being implemented across DoD and have already resulted in significant reductions of toxic chemicals and other pollutants. The policy-driven programs focus on training, efficient facility management and acquisition of environmentally friendly products. P2 programs also cover weapon systems acquisition and research programs. Some specific programs developed under this initiative are the P2 Afloat, PRIME and WRAPS programs described below.

P2 Afloat Program. DoD carefully manages shipboard pollution to avoid impacting coral reefs. The P2 Afloat Program was established in 1995 to develop hazardous material-related pollution prevention strategies for the U.S. Navy Fleet. The program helps to reduce the quantity of hazardous material needed for each Fleet vessel by reducing the use of hazardous materials at the source through process or equipment changes, and recycling or reuse programs onboard ships. These efforts also significantly reduce the amount of hazardous material that could be accidentally released, particularly at ports or harbors which often also are home to coral reefs.

Plastics Removal in Marine Environment (PRIME). The PRIME program (http://www.navy.mil/oceans/PRIMEFS.pdf) focuses on the reduction of plastic consumable commodities aboard U.S. Navy ships, which results in less handling and processing of plastic waste. This program was instituted to comply with the Act to Prevent Pollution from Ships and the International Convention for the Prevention of Pollution from Ships (MARPOL), which ban oceangoing vessels from disposing of plastics in the marine environment. The Navy has a zero plastics discharge policy (as set forth in OPNAVINST 5090.1 series, Environmental Readiness Manual). Navy's PRIME Office, established in 1990, has evaluated over 350,000 items used on Navy vessels, with the aim of reducing or replacing items to eliminate plastic waste. As a result, over 500,000 pounds of plastic previously taken aboard Navy ships each year has been eliminated.

*Waste Reduction Afloat Protects the Sea (WRAPS)***.** Navy established the WRAPS program to reduce the amount of total solid waste brought on board, such as cardboard, by focusing on the sue of non-polluting technologies and elevating waste reduction awareness throughout the supply chain (http://www.navy.mil/oceans/WRAPSFS.pdf).

Marine Resource Protection Projects

DoD projects directly or indirectly contributing to protection of coral reefs and other marine resources are reported in the U.S. Coral Reef Task Force Reports to Congress and at every Task Force meeting. A wide variety of such projects have been reported, ranging from beach clean-up projects to sinking the retired aircraft carrier ex-ORISKANY as an artificial reef.

DoD resource managers work locally and regionally with other resource agencies and non-governmental organizations to carry out cooperative conservation projects. A recent example of a cooperative effort came in 2007 when the Navy provided its nuclear powered research submarine NR-1 and support vessel SSV Carolyn Chouest to support more than a dozen partners in a research cruise throughout the Gulf of Mexico.

Resources Available

Within the mandates of its mission, the Military Services commit substantial Operations and Maintenance funding to environmental and natural resources management. DoD funding may only be used to support the DoD mission and facilities by law, often referred to as "spending within the fence line". Similarly, limitations apply to the use of military equipment for civilian activities. However, there are some DoD programs that support cooperative efforts with non-DoD partners:

Legacy Resource Management Program (http://www.dodlegacy.org/Legacy/index.aspx). This program was established in 1990 to provide financial assistance to DoD efforts to preserve national cultural and natural heritage. Legacy projects can involve regional management initiatives, habitat preservation efforts, archeological investigations, invasive species control, among others. The program assists DoD in protecting and enhancing resources while supporting military readiness.

DoD Sustainable Ranges/ Readiness and Environmental Protection Initiative (https://www.denix.osd.mil/portal/page/portal/denix/range). DoD's conservation buffer program,

the Readiness and Environmental Protection Initiative (REPI), is part of DoD's overall Sustainable Ranges Initiative established to address encroachment on military installations through buffer land acquisition. REPI provides funding for the military to work with state and local governments, non-governmental organizations, and willing landowners to limit encroachment and incompatible land use. REPI funding leverages public/private partnerships in order to promote innovative land conservation solutions that help sustain military readiness while protecting habitat and other natural resources.

Strategic Environmental Research and Development (http://www.serdp.org/). The Strategic Environmental Research and Development Program (SERDP) is DoD's environmental science and technology program, planned and executed in full partnership with the Department of Energy and the Environmental Protection Agency, with participation by numerous other federal and non-federal organizations. The program funds environmental research and development through a competitive process, focusing the areas of Cleanup, Compliance, Conservation and Pollution Prevention technologies. The program has solicited conservation and technology proposals to research indicators of stress on threatened and endangered species, and proposals to develop techniques to monitor these species in inaccessible areas. Coral reef research is a candidate for funding under this program.

Technical Assistance

Through cooperative conservation initiatives, DoD combines its technical expertise with that of other organizations and partners. DoD provides its technical expertise in multiple disciplines from meteorology to modeling, remote data collection to skilled divers. Several programs are highlighted here.

Reserve Affairs Innovative Readiness Training (IRT) (http://www.coastalamerica.gov/text/military.html). The IRT program is a partnership between requesting community organizations and the military. Resource support is a "shared" responsibility in this program. Individual IRT projects provide commanders another option to meet their mobilization readiness requirements, enhancing morale and contributing to military recruiting and retention. These projects are proposed in advance so they can be incorporated into future unit training plans and budgets.

Oceanography Capabilities. The Naval Oceanographic Office (NAVOCEANO) is located at Stennis Space Center near the Mississippi Gulf Coast and is responsible for providing oceanographic products and services to all elements of the DoD. NAVOCEANO personnel work with foreign countries to install hydrographic equipment aboard host-country boats of opportunity and conduct collaborative surveys under formal agreements, which allow NAVOCEANO and the host country to share data and products. NAVOCEANO also partners

with private industry, government organizations and academia to improve collection processing and validate data. Partners include NASA, NOAA, the National Geospatial-Intelligence Agency, U.S. Army Corps of Engineers, numerous universities and others.

Many NAVOCEANO products and services are available online at NAVOCEANO's web site (https://oceanography.navy.mil/legacy/web/). Visitors can search, access and extract model or text data from various databases and libraries. Visitors can also view designated models, request specific information, access the Digital Bathymetric Database-Variable resolution or the Generalized Digital Environmental Model and download text and image files, all with a click of the button.

Educational Opportunities

DoD is committed to increasing the number and quality of our nation's scientists and engineers. The DoD annually supports approximately 8,000 graduate students in fields important to national defense needs (https://ndseg.asee.org/). Student members of research teams may be funded through contracts and grants. Selected by research faculty, the students engage in fundamental studies under the leadership of a senior researcher while earning advanced degrees.

Another important mechanism for DoD support of graduate students is through portable fellowships awarded to U.S. citizens or nationals following a competition each year. These fellowships allow the recipients to pursue their graduate studies at any U.S. institution they choose to attend. One of these is the National Defense Science and Engineering Graduate (NDSEG) Fellowship, which is highly competitive and confers high honors upon its recipients. The DoD has awarded approximately 3,000 NDSEG fellowships since the program's inception 20 years ago.

The International Education Program of the NAVOCEANO is responsible for, managing and administering the hydrographic and related subject matter technical training of international students (military and civilian), per requirements set down by the International Hydrographic Office (IHO).

NAVOCEANO maintains a strong commitment to promoting math and science education for students and teachers through unique programs like these:

> Through the **Personal Excellence Program**, NAVOCEANO provides mentors, science fair judges, subject matter experts (including biologists, practicing mathematicians, geologists, etc.) and career advisors as needed to schools across south Mississippi and southeastern Louisiana.
>
> NAVOCEANO also supports the Consortium for Oceanographic Research and Education’s annual regional competition of the **National Ocean Sciences Bowl** (www.nosb.org) at the J.L. Scott Marine Education Center in Ocean Springs, Miss. Students from Mississippi, Alabama, Louisiana and the Florida panhandle are eligible to compete in the regional bowl, known as the Hurricane Bowl. NAVOCEANO volunteers

write challenging questions for participants and staff the event as moderators, science judges, scorekeepers and rules judges.

Coral Reef Publications and Resources

- **Coral Reef Protection Implementation Plan** http://secnavportal.donhq.navy.mil/portal/server.pt?open=512&objID=302&&PageID=37445&mode=2&in_hi_userid=2&cached=true
- **Coral Reef Conservation Guide for the Military Services** http://secnavportal.donhq.navy.mil/portal/server.pt?open=512&objID=302&&PageID=37445&mode=2&in_hi_userid=2&cached=true
- **Ecological Assessment of Johnston Atoll** http://secnavportal.donhq.navy.mil/portal/server.pt?open=512&objID=302&&PageID=37445&mode=2&in_hi_userid=2&cached=true
- **DoD Environmental Information and Exchange (DENIX) Website, Coastal Ocean Resources** https://www.denix.osd.mil/(page under construction)
- **Secretary of the Navy Information Portal, Deputy Assistant Secretary of the Navy for Environment page** http://secnavportal.donhq.navy.mil/portal/server.pt?open=512&objID=302&PageID=0&cached=true&mode=2
- **Currents Magazine** Stay Current with the Navy's hottest environmental issues at http://www.enviro-navair.navy.mil/index.cfm
- **Joint Services Pollution Prevention and Sustainability Technical Library** http://205.153.241.230/p2_documents/navy.html
- **Navy Ocean Stewardship** http://www.navy.mil/oceans/

Department of Defense - U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) provides design and engineering services, and construction support for a variety of military and civilian projects worldwide. One of the USACE's primary civil roles is to manage the nation's waterways and wetlands. The Army Corps activities include, but are not limited to, constructing projects approved by Congress for flood control, commercial navigation, or shipping channel maintenance; emergency response to natural disasters; operating and maintaining flood control reservoirs and public reclamation facilities; and regulating activities in wetlands including issuing dredge and fill permits and authorizing the establishment of wetland areas.

The environmental mission of the Army Corp of Engineers is to focus its talents and energy to sustain the environment, to enable our worldwide missions and secure the future.

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

The USACE is represented at the USCRTF by the Regulatory branch. 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.

Authorities and Mandates

Clean Water Act

USACE works in conjunction with the EPA to enforce provisions of the CWA. 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.

Compensatory Mitigation for Losses of Aquatic Resources (April 2008)

This rule is applicable for activities authorized by permits issued by the Department of the Army. The rule improves the planning, implementation and management of compensatory mitigation projects of USACE and EPA by emphasizing a watershed approach in selecting compensatory mitigation project locations, requiring measurable, enforceable ecological performance standards and regular monitoring for all types of compensation and specifying the components of a complete compensatory mitigation plan, including assurances of long-term

protection of compensation sites, financial assurances, and identification of the parties responsible for specific project tasks.
http://www.usace.army.mil/cw/cecwo/reg/news/final_mitig_rule.pdf

Environmental Regulation and Permits

USACE Civil Works Regulatory Program uses Regulatory Guidance Letters (RGLs) as a system to organize and track written guidance for field agencies. These RGLs are issued as a result of evolving policy, judicial decisions and changes affecting the permitting program. RGLs can be found at: http://www.usace.army.mil/cw/cecwo/reg/rglsindx.htm

RGLs related to aquatic resources and regulatory interpretations by USACE include:
06-03: Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Creation, Restoration, and/or Enhancement of Aquatic Resources:
http://www.usace.army.mil/cw/cecwo/reg/rgls/rgl06-03.pdf

02-02 - Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899
http://www.usace.army.mil/cw/cecwo/reg/rgls/RGL2-02.pdf

Organizational structure

USACE has headquarters, 8 divisions, and 38 districts. The decisions for projects are taken at the district level. USACE, under the US Army, has two large and separate directorates: Military and Civic Works. Civil Works is organized around three separate programs:

- Planning: conducts new studies and assesses impacts of proposed projects
- Operations: carries out the many ACE projects
- Regulatory: evaluates permit requests, and recommends or requires modifications

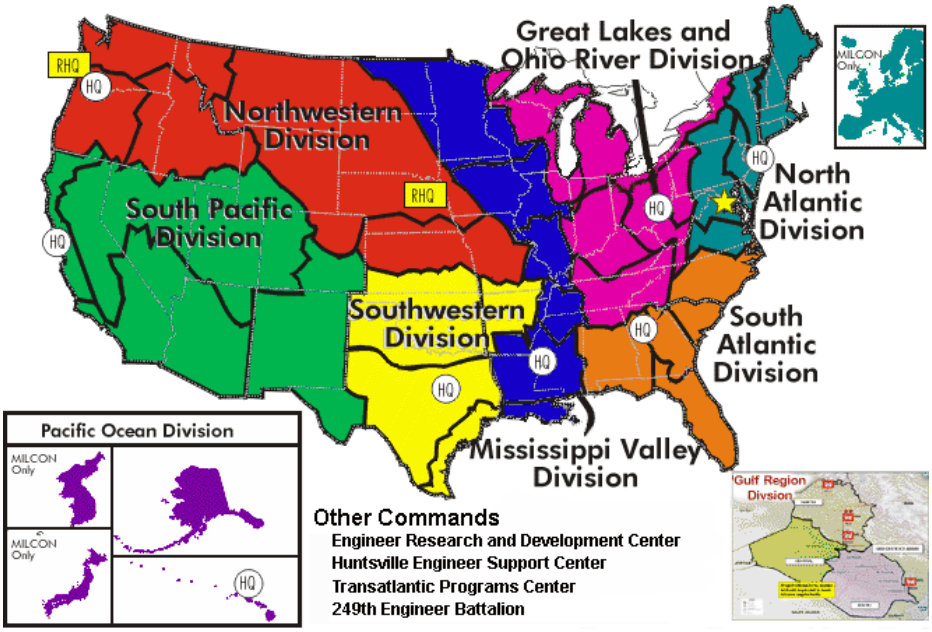
More than half of the environmental budget under Civil Works funds environmental restoration, clean up, and regulatory activities and programs. A substantial portion of the environmental budget is dedicated to mitigation, protection and compliance activities associated with the Corps water resources infrastructure.

The **Planning** program often works with states early in the life of a project, forming partnerships. The **Operations** program is involved in many dredging and maintenance projects across the nation, but its funding is tied to specific projects which have been approved. Every project the USACE undertakes has to have Congressional authorization and funding. The **Regulatory** program works closely with the EPA and acts as the primary evaluator of the Clean Water Act. While about 98% of projects are eventually approved, a majority of them are modified during the review process to minimize their environmental impact. USACE Civil Works Regulatory Program website is found at:
http://www.usace.army.mil/cw/cecwo/reg/

Regions

USACE is divided into geographic districts. Coral areas are encompassed primarily by the South Atlantic Division, which includes the Caribbean region and the Pacific Ocean Division, which includes Hawai`i, Guam and American Samoa.

Visual representation



Programs & Projects

Institute for Water Resources (IWR)
IWR provides USACE with long-range planning capabilities to assist in improving the civil works planning process. The Institute continues to provide the Civil Works program with a variety of products to enhance development and planning. IWR runs three centers: Hydrologic Engineering Center, the Navigation Data Center, and the Waterborne Commerce Statistics Center.
http://www.iwr.usace.army.mil/

The U.S. Army Engineer Research and Development Center (ERCD)
ERDC is one of the most diverse engineering and scientific research organizations in the world. The ERDC conducts R&D in support of the USACE civil works mission, as well as for other Federal agencies, state and municipal authorities, and with U.S. industry through innovative work agreements.
http://www.erdc.usace.army.mil/
Under the ERCD, a center and a program work on aquatic resources:

- *Wetlands Research Technology Center:*
The Wetlands Research Technology Center provides access to an array of technical specialists and interdisciplinary teams in research areas that emphasize the interrelationships of biological,

physical, and chemical environments in order to provide fundamental understanding of ecological processes and dynamics in wetland ecosystems. http://el.erdc.usace.army.mil/wetlands/wetlands.html#wrtc

- Water Operations Technical Support (WOTS) Program:
The WOTS Program provides for the effective transfer of environmental and water quality management technologies to address a wide range of integrated watershed management issues at USACE reservoir and waterway projects, and in the river systems nationwide. WOTS activities are accomplished through three major functional areas: direct technical assistance, technology transfer, and technology application.

The Permanent International Association of the Navigation Congress (PIANC)
USACE serves as a member. The 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.

Regional Projects

Mooring Buoy Installation
Puerto Rico, along Green Beach in Vieques National Wildlife Refuge, the FWS 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.

Pacific Region Interagency Working Group (PRIWG)
The FWS, 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.

Resources Available

Training/Workshops

Institute for Water Resources

Offers education and training opportunities in water resource management.
http://www.iwr.usace.army.mil/inside/products/train/training.cfm
Among the courses offered are:

- **Planning Associates Program**: an advanced training opportunity in water resources planning offered by the U.S. Army Corps of Engineers.
- **Advanced Degree Program in Integrated Water Resources Planning & Management:** Master's and doctorate level degrees in water resources planning and management.

Funding Opportunities

All USACE funding is project-specific and as a result of congressional authorization. No general funds are available from USACE.

Fellowships Offered

Details and Developmental Assignees can be placed for periods of six months or more at headquarter or district level. These placements are often associated with specific projects and often with ties to local universities.

Publications and Documents

Compensatory Mitigation and Monitoring Guidelines
The Honolulu District developed Compensatory Mitigation and Monitoring Guidelines (2005): 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.

Rapid Response and Restoration for Coral Reef Injuries in Southeast Florida: Guidelines and Recommendations
As part of its Maritime Industry and Coastal Construction Impacts Local Action Strategy Committee, Florida hosted a this workshop to examine existing agency emergency response processes and compile technologies and procedures for restoring damaged coral habitats. 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.

Hydrogeomorphic (HGM) Approach
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.

Department of State

The mission of the Department of State is to create a more secure, democratic, and prosperous world for the benefit of the American people and the international community. The Department of State is the lead institution for the conduct of American diplomacy, a mission based on the role of the Secretary of State as the President's principal foreign policy adviser. U.S. diplomacy is an instrument of power, essential for maintaining effective international relationships, and a principal means through which the United States defends its interests, responds to crises, and achieves its international goals.

The Department of State is represented on the USCRTF by the Bureau of Oceans & International Environmental & Scientific Affairs. The Bureau promotes transformational diplomacy through advancing environmental stewardship, encouraging economic growth, and promoting social development around the globe to foster a safer, more secure and hopeful world (http://www.state.gov/g/oes/).

International Agreements

DOS represents the US in treaties, international agreements and conventions. The following are some of these agreements most relevant to coral reef conservation:

South Pacific Regional Environment Program (SPREP) Agreement

The South Pacific Regional Environment Program (SPREP) has existed for nearly fifteen years to protect and improve the South Pacific environment and to ensure sustainable development in that area. The U.S. territories of American Samoa, Guam and the Commonwealth of the Northern Mariana Islands, are located within the SPREP area. SPREP provides for increased cooperation among the United States, Australia, New Zealand, France and twenty-two island States and territories of the South Pacific area in addressing issues affecting environment and development in the region.

The Convention on Biological Diversity (CBD)

As the first global agreement on the conservation and sustainable use of biological diversity this treaty gained rapid and widespread acceptance. Over 150 governments signed the document and since then more than 187 countries have ratified the agreement. The Convention has three main goals: 1) The conservation of biodiversity, 2)Sustainable use of the components of biodiversity, and 3) Sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way

Convention on International Trade in Endangered Species (CITES)

CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES conservation goals are to: monitor international trade in endangered species; maintain those species in an ecological balance; and assist countries toward a sustainable use of species through international trade. As of 2007, 172 Parties have adopted the Convention.

UN Framework Convention on Climate Change (UNFCC)

The UNFCCC creates a broad global framework for addressing the challenge of climate change. It establishes an objective, commitments for different groups of countries, and a set of

institutions to enable governments to consider and adopt appropriate actions and to monitor the Convention's implementation. The United States ratified the UNFCCC on October 15, 1992, becoming the first industrialized nation and the fourth nation overall to do so.

Executive Order 13089, "Coral Reef Protection"
DOS, along with USAID, support the international charge of the executive order to "assess the U.S. role in international trade and protection of coral reef species and implement appropriate strategies and actions to promote conservation and sustainable use of coral reef resources worldwide."

Organizational structure

The directorate of Oceans, Environment and Science has several directorates to assist it advance its mission. The environmental directorate, specifically the Office of Ecology and Natural Resources Conservation, has the lead responsibility for coral reefs. Funding directly related to coral reef conservation averages 1.55 million dollars annually.

International Programs

The International Coral Reef Initiative (ICRI)

ICRI is a public-private partnership that brings together governments, international organizations, scientific entities, and non-governmental organizations committed to reversing the global degradation of coral reefs and related ecosystems, such as mangrove forests and sea grass meadows, by promoting the conservation and sustainable use of these resources for future generations. ICRI aims to catalyze action that will improve management practices, increase capacity and political support and share information on the health of these ecosystems. DOS continues to provide substantial financial support to the International Coral Reef Initiative (ICRI) and ICRI-related activities, such as the publication of the biennial *Status of Coral Reefs of the World*: www.icriforum.org

ICRI Coral Reef Crime Scene Investigation Program

The DOS funds the ICRI Coral Reef Crime Scene Investigation program which trains coral reef managers, marine protected area managers, enforcement officers and investigators through regional workshops. The workshops involve lectures and demonstrations related to the relatively new field of coral reef forensic investigations, along with injury and crime scene investigations guided by international professionals in wildlife enforcement, coral reef ecology and marine natural resource investigation. Workshops have taken place in the Caribbean and Southeast Asia and the Indian Ocean and are planned for the South Pacific, East Africa, as well as additional workshops in the Caribbean.

Coral Triangle Initiative (CTI)

In August 2007, President Yudhoyono of Indonesia proposed the creation of the CTI. The ultimate goal of this new multilateral partnership is to safeguard the region's extraordinary marine and coastal biological resources for future generations by promoting sustainable fisheries, sustainable livelihoods and climate change resilience and adaptation measures, thereby strengthening regional security and prosperity. In August 2008, DOS finalized a $750,000 grant

to the NGO consortium to support the development of a self-sustained operation of the CTI secretariat, including regional cooperation processes among six governments.

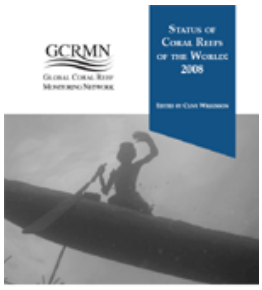
The Regional Seas Programme

The DOS funds the Regional Seas Programme, an action-oriented program that focuses not only on the mitigation or elimination of the consequences but also on the causes of environmental degradation of the oceans. It has a comprehensive, integrated, result-oriented approach to combating environmental problems through the rational management of marine and coastal areas. Each regional action plan is formulated according to the needs of the region as perceived by the Governments concerned. It is designed to link assessment of the quality of the marine environment and the causes of its deterioration with activities for the management and development of the marine and coastal environment. The action plans promote the parallel development of regional legal agreements and of action-oriented program activities. The programme includes thirteen regions involving more than 140 coastal states and territories.

Sula-Suluwesi Sea Ecoregion

In 2004, financial support from DOS provided the impetus for Indonesia, Malaysia, and the Philippines to sign their first tri-national cooperative agreement, thereby establishing the Sula-Suluwesi Sea Ecoregion. This ecoregion is of enormous ecological and economical importance, featuring productive ecosystems such as coral reefs, seagrass beds, and mangrove forests. Its marine biodiversity includes more than 400 species of corals and 650 species of reef fishes, as well as five of the seven species of marine turtles. The ecoregion also serves as an important source of food and livelihood for countless subsistence and commercial fishermen.

Publications and Documents



Status of Coral Reefs of the World: 2008

The report is the 5th global report since the Global Coral Reef Monitoring Network was formed in 1996 as an operational network of the ICRI. Each report has aimed to present the current status of the world's coral reefs, the threats to the reefs, and the initiatives being undertaken under the umbrella of ICRI to arrest the decline of the world's coral reefs.
http://www.gcrmn.org/status2008.aspx

Economic Values of Coral Reefs, Mangroves, and Seagrasses 2008

Recognizing the importance of economic valuations, in January 2008, the International Coral Reef Initiative (ICRI) established an Ad Hoc Committee on Economic Valuation of Coral Reef Ecosystems. The Committee is co-chaired by the Mexico-United States ICRI Secretariat and the World Resources Institute (WRI), and has as its primary responsibility the compilation of an inventory of studies, articles and publications to support ICRI members in coral reef valuation.

Environmental Protection Agency

The mission of the Environmental Protection Agency (EPA) is to protect human health and the environment. EPA is the lead Federal agency responsible for protecting the quality of the Nation's drinking and surface waters, and strives to ensure that all waters, including coral reefs, are successfully managed, protected, and restored to sustain healthy biological communities and to protect human health. EPA has the technical expertise, authority under the Clean Water Act, and a suite of both regulatory and nonregulatory mechanisms to compare coral reef conditions among sites and regions, and to address the threats from land-based point and nonpoint sources of pollution. In addition, EPA has a close working relationship with state and territorial partners, due in part to the key role given to them in the Clean Water Act and facilitated by EPA's organizational structure, which includes 10 regional offices that serve as the focal point for our interaction with the states and territories.

EPA's designee to the USCRTF is the Assistant Administrator for Water. The Director of the EPA Office of Wetlands, Oceans, and Watersheds (OWOW) is the EPA Meeting Representative to the USCRTF. The Oceans and Coastal Protection Division (OCPD), under OWOW, staffs OW on the USCRTF. The mission of OCPD is to protect and restore the ocean and coastal ecosystems by promoting watershed-based coastal management, preventing pollution of the marine environment, monitoring and assessing coastal conditions, and establishing effective partnerships.

EPA has taken a strong role in protecting coral reefs in the USCRTF jurisdictions through research; grant funding; technical assistance; and program development, implementation, and enforcement. Given our statutory authorities and technical expertise, EPA has focused our efforts both nationally and regionally on addressing the threats to coral reefs from land-based sources of pollution. Within that focus area, EPA have worked with our state and territorial partners on a broad variety of activities, from funding for water infrastructure improvements and nonpoint source controls to providing technical and other assistance in the development of the local action strategies for land-based sources of pollution, and to supporting long-term water quality and coral reef monitoring projects. In addition, EPA is providing technical guidance for states and territories on the development and implementation of bioassessment procedures and their application in establishing biological criteria for the protection of coral reefs. Standards based on biological criteria are powerful management tools because biological communities are dependable indicators of the health of an aquatic ecosystem.

Authorities and Mandates

Clean Water Act (CWA) - EPA is the Federal agency responsible for implementing the CWA to protect the physical, chemical, and biological integrity of the nation's waters. Key CWA programs that serve to protect coral reefs by controlling pollution in all surface waters within the Act's jurisdiction include: the National Pollution Discharge Elimination System point source permit program; water quality standards and criteria, including biocriteria; CWA and Safe Drinking Water Act State Revolving Funds for wastewater and drinking water infrastructure; technical assistance and the CWA Section 319 grant program to address nonpoint source pollution; water quality monitoring and reporting; and the CWA Section 303(d) Total Maximum Daily Load program. In addition, EPA shares responsibility with the U.S. Army Corps of Engineers for implementing CWA Section 404, which regulates discharges of dredged or fill

material to waters of the U.S. By controlling pollution before it reaches coastal and ocean waters, these programs contribute to EPA's overall ocean and coastal protection activities, including protection of coral reefs.

Clean Water Act Section 404
EPA's regulations at 40 CFR Part 22 (230.44), known as the Section 404(b)(1) Guidelines for disposal of dredged or fill material, identify coral reefs as a "special aquatic site" and describe factors that must be considered when authorizing sites for discharge of dredged or fill material.

Special Emphasis Given to Coral Reef Protection under the Clean Water Act, Marine Protection, Research, and Sanctuaries Act, Rivers and Harbors Act, and Federal Project Authorities
Memorandum for the Field to clarify and reemphasize the protection afforded the Nation's coral reef ecosystems under the Clean Water Act (CWA) Section 404 regulatory program, the Marine Protection, Research, and Sanctuaries Act (MPRSA) Sections 102 and 103 provisions, Rivers and Harbors Act (RHA) Section 10 requirements, and Federal Projects conducted by the Corps.
http://www.epa.gov/owow/wetlands/guidance/coral.html

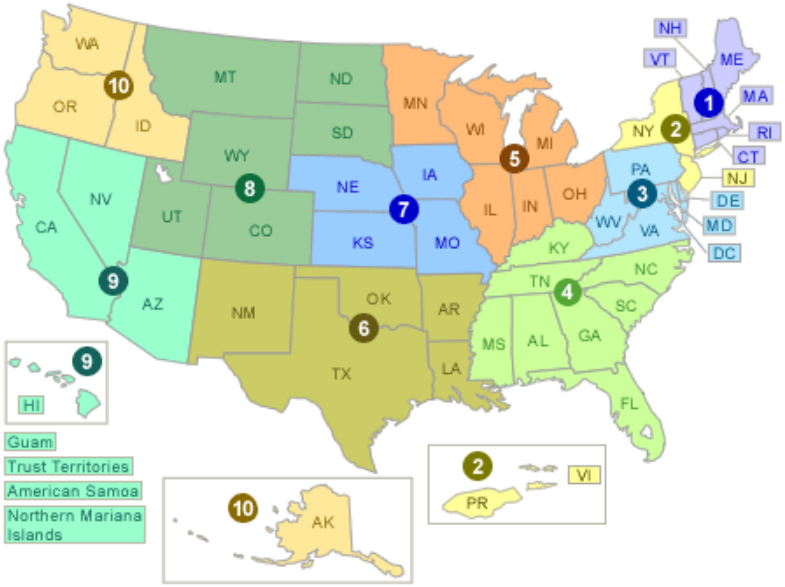
Organizational Structure

There are several offices within EPA that address coral reef protection: Office of Water, Office of Research and Development, Office of Environmental Information, and several EPA regional offices. An EPA organizational chart can be found here:
http://www.epa.gov/water/org_chart/index.htm#

EPA Coral Reef Regions

Three of EPA's 10 Regional offices have responsibility for working with jurisdictions that are represented on the Task Force:

Region 2: Puerto Rico and U.S. Virgin Islands
Region 4: Florida
Region 9: Hawai`i, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands



Programs & Projects

Select Coral Reef-Related Programs

EPA's Environmental Monitoring and Assessment Program (EMAP)
EMAP, in the Office of Research and Development, develops the tools necessary to monitor and assess the status and trends of national ecological resources. EMAP's goal is to develop the scientific understanding for translating environmental monitoring data from multiple spatial and temporal scales into assessments of current ecological condition and forecasts of future risks to our natural resources.

National Coastal Condition Report
The National Coastal Condition Report (NCCR) describes the ecological health of U.S. coastal waters and the Great Lakes at a regional and national scale. First issued in 2001, and updated periodically thereafter, the NCCR is a collaborative effort among EPA and other Federal agencies, as well as state, regional, and local organizations. It is one of only a few statistically-significant measures of U.S. water quality on a nationwide basis. The 2004 NCCR was produced using data from EMAP. The third National Coastal Condition Report, released in 2008, assesses condition of the nation's coastal waters, including Alaska and Hawaii, based primarily on coastal monitoring data from EPA's National Coastal Assessment collected in 2001 and 2002. The condition of the nation's coastal waters continues to be fair. An analysis of temporal changes in estuarine condition from 1990 to 2002 is presented for the nation's coastal waters and by region.

EPA's Marine Debris Prevention Program
EPA uses a comprehensive watershed approach to address the issue of marine debris. Marine debris is an environmental problem that stretches beyond the set responsibilities of any individual EPA office. As a result, EPA through pollution prevention, recycling, waste treatment and control programs, and partnerships addresses the various stressors that lead to

marine debris. In addition, EPA uses existing regulatory authorities and mandates to address the sources, movement, and impacts of marine debris.

The Marine Debris Prevention Program focuses on outreach and research activities to increase awareness of the marine debris issue and identify the links between human behaviors and marine debris. EPA also works to address the gaps associated with characterizing and understanding marine debris. EPA supports community cleanups, such as the International Coastal Cleanup; public education linking recycling and solid waste management with marine debris prevention; and marine debris monitoring, such as the recently completed National Marine Debris Monitoring Program.

Establishing Biocriteria for the Protection of Coral Reefs
EPA is providing technical guidance for states and territories on the development and implementation of bioassessment procedures and their application in establishing biological criteria (biocriteria) for the protection of coral reefs. CNMI and America Samoa are expected to incorporate these protections in their next revision of water quality standards rules. Standards based on biological criteria are powerful management tools because biological communities are dependable indicators of the health of an aquatic ecosystem.

Ecological Research Program
Coral reef research is being conducted in the Ecological Research Program (ERP) in EPA's Office of Research and Development to provide decision support tools for protection, enhancement, restoration and sustainability of coral reef ecosystems and the services they provide. The tools will provide managers the means to prioritize and evaluate land use decisions with better knowledge of downstream costs and benefits to coral reef services. Information can be found at http://www.epa.gov/ord/erp/quick-finder/coral-research.htm

Florida

Water Quality Protection Program for the Florida Keys National Marine Sanctuary
As directed by the Florida Keys National Marine Sanctuary (FKNMS) and Protection Act of 1990, EPA and the State of Florida, in consultation with NOAA, developed a Water Quality Protection Program (WQPP) for the FKNMS. The purpose of the WQPP is to recommend priority corrective actions and compliance schedules addressing point and nonpoint sources of pollution to restore and maintain the chemical, physical and biological integrity of the FKNMS. The FKNMS includes North America's only living coral barrier reef. The WQPP action plan was completed in 1996 and was the first water quality action plan ever developed for a national marine sanctuary. The WQPP includes numerous activities to address land-based sources of pollution, a comprehensive long-term monitoring program (water quality, coral reef and seagrass components), special studies, data management, and public education/outreach activities. EPA has provided the majority of funding (about $14 million) for the WQPP's long-term status and trends monitoring projects, which are now in their fourteenth consecutive year. EPA has also worked with all stakeholders in the Florida Keys to develop a Water Quality Communications Plan and funded a grant to the University of North Carolina Environmental Finance Center to assist local governments with developing a plan for identifying and securing funds to implement expensive wastewater and storm water upgrades in the Florida Keys.

Centralized Management of Decentralized Wastewater Systems Project

In October 2006, with guidance and direction from the FKNMS Water Quality Protection Program Steering Committee (an interagency group), EPA made a $3.8 million grant to the Village of Islamorada, Florida. The purpose of this grant is to demonstrate and evaluate the centralized management of decentralized wastewater systems in the Florida Keys. This demonstration project is consistent with Monroe County's Wastewater Master Plan and will result in a significant reduction of nutrient and other pollutant loading to the nearshore waters of the Florida Keys.

Southeast Florida Coral Reef Initiative/Land-Based Sources of Pollution Focus Team
EPA Region 4 staff serves on the Southeast Florida Coral Reef Initiative (SEFCRI) Work Group and the associated Land-Based Sources of Pollution Focus Team. As recommended by the USCRTF, the purpose of SEFCRI was to develop a local action strategy (LAS) to conserve, protect and manage the coral reef habitat of southeast Florida. The LAS was finalized in December 2004 and Region 4 staff continues to work with all stakeholders to implement the various actions recommended by the LAS to reduce the loading of land-based sources of pollution to the coastal waters of southeast Florida. Specifically, EPA is funding numerous special studies to quantify, characterize and prioritize the land-based sources of pollution and identify how that pollution affects the coral reef ecosystem of southeast Florida.

Caribbean

USVI Point Source Discharge Regulations
EPA assisted the USVI government in revising its Clean Water Act Territorial Pollution Discharge Elimination System (TPDES) regulation to authorize a construction storm water construction general permit (CGP). The revised regulation, which was signed by the USVI governor on June 20, 2007, and became effective on December 1, 2007, authorizes the discharge of storm water from construction sites if specific management practices are implemented. This federally enforceable program should lead to stricter land-based erosion controls at construction sites and reduced levels of suspended solids and sediment released into sensitive coastal areas where coral reefs are present.

USVI Monitoring Programs and Indicators
EPA and USVI partnered to research and develop indicators for monitoring the condition of the territory's coral reefs. Specific indicators of human impacts to the corals have been identified, which can be useful to the USVI in determining acceptable coral condition in the context with the Territory's water quality standards. The USVI is in the process of revising its water quality standards to facilitate possible development of stony coral biocriteria.

Bioassessment Tools for Stony Corals

EPA completed the first phase of a biological survey in St. Croix, U.S. Virgin Islands to inform and calibrate a long-term monitoring strategy for development of coral reef biocriteria. Using EPA's Ocean Survey Vessel BOLD as a platform for operations, EPA and USVI personnel completed physical and biological measurements of nearly 4,000 corals and 62 stations around St. Croix. In the first phase, stations were targeted to fulfill some of the requirements of a defensible long-term monitoring program; these included definition of management zones, reef

types and sampling units, documentation of measurement variability and reference conditions, and characterization of metric responses to gradients of human activity. Data from the biological survey were used to validate metrics and the approach presented in the Rapid Bioassessment Protocol.

USVI Environmental Stewardship Initiative
EPA is working with the USVI government to better address the problem of nonpoint source pollution control and management using a holistic approach featuring compliance assistance, community outreach/capacity building, funding assistance, and program enforcement. EPA alone developed an implementation framework that outlines strategies for: building partnerships among stakeholders; educating the public about the need to control nonpoint source pollution; and identifying appropriate technical assistance and needed funding resources. This initiative was launched with a pilot in Coral Bay, St. John, where it has already resulted in focused efforts to control high-capacity septic systems and construction runoff control.

EPA CARE grant
Strategic Implementation of the Coral Bay Watershed Management Plan for Coral Bay, St. John, US Virgin Islands ($300K for the Coral Bay Community Council, Inc.) The goal of this grant is to reduce pollutant run-off impacts to Coral Bay by initiating implementation of the Coral Bay Watershed Management Plan.

Pacific

Hanalei Watershed Hui (Hawai`i)
As part of Hawaii's land-based pollution LAS, EPA, USGS, and NRCS and other Federal and local partners are collaborating with the Hanalei Watershed Hui to implement pollution reduction activities in the Hanelei watershed, on Kaua‘i and to monitor the coral reefs.

Kauai Stormwater Settlement Agreement (Hawai`i)
The EPA has led strong Clean Water Act enforcement actions in Hawai`i which have helped protect coral reefs and deter those who would violate the Act. Violations resulting in sediment damage to a coral reef on Kauai, Hawai‘i, were resolved in a settlement agreement totaling more than $7.5 million involving the EPA, DOJ, Hawai‘i, Kauai County, and Earth Justice. The settlement includes $5.3 million to prevent erosion and restore streams at the construction site.

Large-capacity Cesspool Closures (Hawai`i)
EPA has implemented an enforcement strategy to identify and close approximately 3,000 large-capacity cesspools (LCC). Cesspools pose environmental and public health risks by releasing disease-causing pathogens and other contaminants to groundwater and coastal waters. As of 2006, 447 LCC in Hawai`i have been closed under regulatory authority, 923 cesspools are being voluntarily closed, and 906 LCC are under formal enforcement actions to close. Cesspool closure and wastewater upgrades at public beach parks, schools, plantation camps, and businesses will improve water quality for Hawaii's coral reefs.

Guam Wastewater Spill Reduction
The EPA, with the DOJ, worked with Guam to reduce wastewater spills during 2004-2006 by 90 percent from 2001-2002 levels. Enforcement actions resulted in marked improvements to water utility operations, which substantially decreased pollution to reefs from sewage overflows.

Also in Guam, new sewer collector lines will be installed to improve wastewater infrastructure in Agat, which will prevent sewage overflows and protect coral reefs by eliminating excess nutrient loading to the ocean.

Guam Military Buildup

EPA is working with the Navy, Guam, NOAA, Army Corps of Engineers, and FWS to plan for the Guam military buildup, including facility improvements within Apra Harbor. New ammunition wharf, aircraft carrier berth, and commercial port facilities may impact tens of acres of coral reefs. EPA's goal is to minimize impacts to coral reefs from dredging and fill discharges associated with the new facilities, and to design appropriate projects for compensatory mitigation.

Resources Available

Funding Opportunities

EPA offers many funding opportunities for a large variety of environmental projects. These opportunities are listed here: http://www.epa.gov/ogd/grants/information.htm and http://www.epa.gov/region09/water/oce/coralreefs-grants.html. Below is a summary of some EPA grants that might be most applicable to coral reef projects.

EPA STAR Grants

STAR program funds research grants and graduate fellowships in numerous environmental science and engineering disciplines through a competitive solicitation process and independent peer review. The program engages the nation's best scientists and engineers in targeted research that complements EPA's own outstanding intramural research program and those of our partners in other Federal agencies.

Wetlands Protection Grants (State/Tribal/Local)

Assist state, tribal and local wetlands protection efforts. Funds can be used to develop new wetlands protection programs or refine existing protection programs.

Pollution Prevention Grant Program

The purpose of the P2 Grant Program is to give states and Tribes the capability to assist businesses and industries in identifying better environmental strategies and solutions for complying with Federal and state environmental regulations. It also aims to improve business competitiveness without increasing environmental impacts. The majority of P2 Grants fund state-based projects for technical assistance, training, outreach, education, regulatory integration, data collection, research, demonstration projects, and recognition programs. http://www.epa.gov/oppt/p2home/pubs/grants/ppis/ppis.htm

BEACH Act Grants

EPA made $9.75 million in grants available in 2008 to eligible states to protect public health at the Nation's beaches. These grants help coastal and Great Lakes states implement programs to monitor water quality at the beach and to notify the public when water quality problems exist.

Watershed Funding

Committed watershed organizations and state and local governments need adequate resources to achieve the goals of the Clean Water Act and improve our nation's water quality. To support these efforts, the U.S. Environmental Protection Agency (EPA) has created this Web site to provide tools, databases, and information about sources of funding to practitioners and funders that serve to protect watersheds.
http://www.epa.gov/owow/funding.html

Environmental Education Grants Program

The goal of this program is to support environmental education projects which enhance the public's awareness, knowledge, and skills to make informed and responsible decisions that affect environmental quality. EPA awards grants each year based on funding appropriated by Congress. Annual funding for the program ranges between $2 and $3 million. More than 75 percent of the grants awarded by this program receive less than $15,000.
http://www.epa.gov/enviroed/grants.html

Fellowships Offered

National Network for Environmental Management Studies (NNEMS)

The program provides students with practical research opportunities and experiences in an EPA office or laboratory, encourages careers in environmental studies, and helps to defray the costs associated with these programs. Each year, the NNEMS program offers fellowships developed and sponsored by EPA Headquarters in Washington, D.C. and in EPA's 10 regional offices and laboratories throughout the United States. The projects are specifically narrow in scope, allowing students to complete the fellowship while working full-time at EPA during the summer or part-time during the school year. Recipients of NNEMS fellowships receive a stipend based on the student's level of education and the duration and location of the project
http://www.epa.gov/enviroed/NNEMS/

National Center for Environmental Research

The center offers several fellowships available to students to do work in the environmental science field. A full listing of these fellowships is available at: http://es.epa.gov/ncer/fellow/

Publications and Documents

The Catalog of Federal Funding Sources for Watershed Protection

A searchable database of financial assistance sources (grants, loans, and cost-sharing) available to fund a variety of watershed protection projects. To select funding programs for particular requirements, use either of two searches: one is based on subject matter criteria, and the other is based on words in the title of the funding program. Criteria searches include the type of

organization (e.g., non-profit groups, private landowner, state, business), type of assistance sought (grants or loans), and keywords (e.g., agriculture, wildlife habitat).
Searchable database: http://cfpub.epa.gov/fedfund/

Charting a Course Toward Diagnostic Monitoring: A Continuing Review of Coral Reef Attributes and a Research Strategy for Creating Coral Reef Indexes of Biotic Integrity

This report reviews coral reef attributes for a research strategy to create coral reef indexes of biotic integrity (IBIs). Once developed, these indices can be used in coral reef biocriteria programs for diagnostic monitoring of coral reefs around the world.
http://www.epa.gov/owow/oceans/coral/documents/charting.pdf

Development of Biological Criteria for Coral Reef Ecosystem Assessment

Provides the EPA advice on the feasibility of establishing biological criteria for assessing coral reef ecosystems. Report outlines the development stages of coral reef ecosystem biocriteria.
http://www.epa.gov/owow/oceans/coral/documents/biocrit.pdf

Climate Change Effects on Stream and River Biological Indicators: A Preliminary Analysis

EPA has published a final report, Climate Change Effects on Stream and River Biological Indicators: A Preliminary Analysis, available to download at
http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=190304.

Report Looking at Management Implications of Climate Change in America Samoa (ORD)

Climate variability and change can negatively impact sensitive coral reef ecosystems by altering sea surface temperatures, ocean carbonate concentrations, sea level, storm surges, precipitation patterns, stream flows to the coast, salinity, and pollution loads. US EPA has published a place-based study examining these issues entitled, “Climate Change and Interacting Stressors: Implications for Coral Reef Management in American Samoa.”
To download the report, go to: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=173312

Framework Under Development for Categorizing Biological Indicators According to Climate Sensitivity and Modifying Assessment Methods to Detect Climate Change Effects

EPA has drafted a report, for publication in late 2007 or early 2008, describing a framework to categorize biocriteria according to their sensitivity to climate change and to examine the ability of state biocriteria programs to detect effects and continue to determine impairment under a changing climate. The categorization considers what kind of biological indicators may be (1) sensitive to climate change (e.g., thermal tolerances of organisms), (2) insensitive to climate change, and (3) sensitive to climate change and other stressors. Initial work focused on rivers and streams, but the framework is transferable to other ecosystems such as coral reefs. Further analysis is needed to examine what kinds of indicators may be useful for coral reef ecosystems, how these respond to climate change, and what indicators will not confound climate change effects with other stressors.

Stony Coral Rapid Bioassessment Protocol

EPA has developed a *Stony Coral Rapid Bioassessment Protocol* to provide interested states and territories with a simple and rapid coral survey method that uses multiple bioindicators to characterize coral condition and associated water quality. It offers insight on indicator relevance to ecosystem services (societal values), reef condition, and sustainability. Three publications have been finalized in support of this effort:

Bioassessment Tools for Stony Corals: Field Testing of Monitoring Protocols in the US Virgin Islands (St. Croix)
http://www.epa.gov/bioindicators/pdf/EPA-260-R-06-004StonyCoralsUSVIFieldTesting_.pdf

Bioassessment Tools for Stony Corals: Statistical Evaluation of Candidate Metrics in the Florida Keys
http://www.epa.gov/bioindicators/pdf/EPA-260-R-06-002StonyCoralsFLKeys.pdf

Bioassessment Tools for Stony Corals: Monitoring Approaches and Proposed Sampling Plan for the U.S. Virgin Islands
http://www.epa.gov/bioindicators/pdf/EPA-260-R-06-003CoralReefsUSVI_sampling_plan.pdf

For more information, please visit: http://www.epa.gov/bioindicators/html/publications.html

National Aeronautics & Space Administration

NASA's mission is to pioneer the future in space exploration, scientific discovery and aeronautics research.

NASA's Science Mission Directorate (http://nasascience.nasa.gov/about-us) explores the Earth, moon, Mars and beyond; charts the best route of discovery; and reaps the benefits of Earth and space exploration for society. Earth is a complex, dynamic system we do not yet fully understand. The Earth system is comprised of diverse components that interact in complex ways. We need to understand the Earth's atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere as a single connected system. Our planet is changing on spatial and temporal scales. The purpose of NASA's Earth Science Division (http://nasascience.nasa.gov/earth-science) is to develop a scientific understanding of Earth's system and its response to natural or human-induced changes, and to improve prediction of climate, weather, and natural hazards. NASA researchers utilize satellite, aircraft and other suborbital and *in situ* platforms to understand and protect our home planet. Research varies from local to global scales, and necessarily interfaces with technology development, high end computing, and modeling.

The agency is represented at the Task Force by the Ocean Biology and Biogeochemistry research program (http://oceancolor.gsfc.nasa.gov/) under the Earth Science Division of the Science Mission Directorate.

Organizational structure

NASA Headquarters, located in Washington, D.C., provides overall guidance and direction to agency research and technology development. Ten field centers and a variety of installations conduct the day-to-day work in laboratories, on air fields, in wind tunnels and in control rooms.

Ames Research Center - Moffett Field, California
Dryden Flight Research Center - Edwards, California
Glenn Research Center - Lewis Field, Ohio
Goddard Space Flight Center - Greenbelt, Maryland
Wallops Flight Facility - Wallops Island, Virginia
Jet Propulsion Laboratory - Pasadena, California
Johnson Space Center - Houston, Texas
Kennedy Space Center - Cape Canaveral, Florida
Langley Research Center - Hampton, Virginia
Marshall Space Flight Center - Huntsville, Alabama
Stennis Space Center - Mississippi

Field Centers

Visual representation of field centers listed above

Programs & Projects

NASA's Ocean Biology and Biochemistry (OBB) Program covers a wide range of research areas, including carbon cycle science, phytoplankton physiology and productivity, air-sea gas exchange, ecosystem-carbon-climate modeling, ecological and biodiversity studies, as well as technology development, algorithm development and refinement, and data merging. The OBB Program supports research in the scientific application of remote sensing technologies. A large part of the research program is involved in interagency efforts with the U.S. Climate Change Science Program, the Carbon Cycle Science Program, including the North American Carbon Program and Ocean Carbon and Biogeochemistry Program, as well as integration with the International Ocean Color Coordinating Group.

Priority Science Questions:

- How are ocean ecosystems and the biodiversity they support influenced by climate and environmental variability and change, and how will these changes occur over time?
- How do carbon and other elements transition between ocean pools and pass through the Earth System, and how do biogeochemical fluxes impact the ocean and Earth's climate over time?
- How (and why) is the diversity and geographical distribution of coastal marine habitats changing, and what are the implications for the well-being of human society?
- How do hazards and pollutants impact the hydrography and biology of the coastal zone? How do they affect us and can we mitigate their effects?

These four overarching questions address 1) marine ecosystems, 2) ocean biogeochemistry, 3) coastal habitats, and 4) hazards. Each topic addresses feedbacks related to humankind.

Remote Sensing Assets

NASA funded research uses remote sensing as the primary research tool. NASA's remote sensing assets include satellite and airborne sensors. Ocean color remote sensing data, such as the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) or Moderate Resolution Imaging Spectroradiometer (MODIS) provides quantitative data on global ocean bio-optical properties to the Earth science community. Subtle changes in ocean color signify various types and quantities of marine phytoplankton (microscopic marine plants), the knowledge of which has both scientific and practical applications. NASA develops and operates research data systems that process, calibrate, validate, archive and distribute data received from an Earth-orbiting ocean color sensor.

Since an orbiting sensor can view every square kilometer of cloud-free ocean every 48 hours, satellite-acquired ocean color data constitute a valuable tool for determining the abundance of ocean biota on a global scale and can be used to assess the ocean's role in the global carbon cycle and the exchange of other critical elements and gases between the atmosphere and the ocean.

Satellite assets relevant to the Task Force include MODIS on the Terra and Aqua satellites that view the entire Earth's surface every 1 to 2 days (http://modis.gsfc.nasa.gov/). Data products from MODIS include phytoplankton chlorophyll a and sea surface temperature, among others (http://oceancolor.gsfc.nasa.gov/). Airborne imaging systems include the Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) (http://aviris.jpl.nasa.gov/) and high resolution digital camera systems. Funded researchers may submit flight requests using available platforms and sensors in the NASA airborne science asset catalogue (http://asapdata.arc.nas.gov/) using the flight request system (http://airbornescience.nasa.gov/sofrs/). Further archived data can be requested via the aforementioned web sites.

Example Funded Coral Reef Research Projects

NASA supports the Task Force through NASA research announcements released via the annual omnibus Research Opportunities in Space and Earth Science (ROSES, http://nspires.nasaprs.com/external/). The following excerpts are examples of projects supported under a range of program elements, including Carbon Cycle Science, Interdisciplinary Science, Ocean Biology and Biogeochemistry, and Earth System Science research using data and products from TERRA, AQUA, and ACRIMSAT Satellites.

Landsat 7 Coral Reef Images

Global data acquisition for coral reef mapping was initiated through the Landsat 7 Long Term Acquisition Plan. Once the instrument began acquiring data over coral reefs, it took several years to get the needed acquisitions because of tropical cloud cover, and to find ways to purchase or trade for the over 1000 scenes necessary to complete the global coverage. The data assembly was led by scientists in the Institute for Marine Remote Sensing at the University of South Florida. A number of groups within NASA provided Landsat scenes, and collaborators in mapping projects around the world shared their data in order to assemble the most complete possible archive of Landsat 7 data.
http://oceancolor.gsfc.nasa.gov/cgi/landsat.pl?sub=main_page&path=7&row=76&x=236&y=210&n=0&t=IMaRS

Millennium Coral Reef Mapping Project

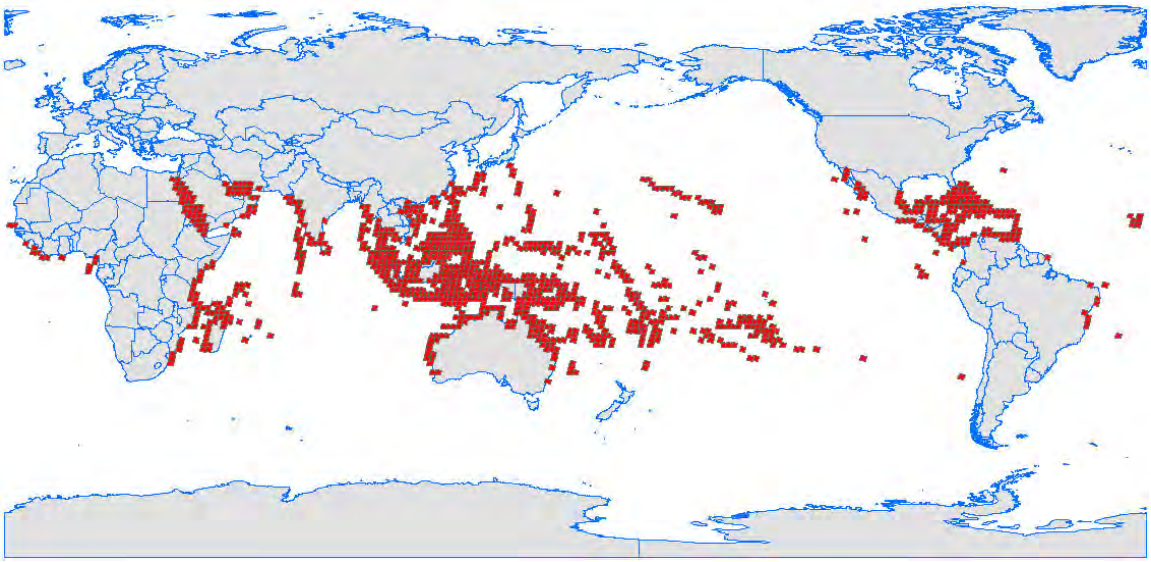
In a NASA-sponsored partnership between remote sensing scientists, international agencies, and NGOs, new efforts are being made to (1) develop low-resolution reef maps encompassing all

tropical oceans to provide a foundation for more detailed future investigation, (2) assemble key baseline remote sensing data needed for future research in coral reef environments, and (3) partner with international organizations to use remote sensing data for applied science problems and improved coral reef management. This partnership developed the first uniform global maps of shallow coral reef geomorphology—Millennium Coral Reef Maps—which cover a vast area and include over 80 percent of the Earth's shallow tropical coral reefs. The project differs from other coral ecosystem mapping efforts in both resolution and geographic focus. The Millennium maps are based on Landsat imagery (a low-resolution satellite source with a pixel size of 30 square meters) and focus on geomorphologic structure in non-U.S. territories, whereas the NOAA maps use imagery with a finer resolution (1- to 4- meter pixels) and provide information on reef zonation, underlying structural characteristics, and biological cover for reef areas in the U.S. territories and Palau. Thanks to close communication among the participants, project scientists were able to minimize geographic overlap and avoid duplication of effort, and as a result, the projects and products complement each other well.

The Millennium Coral Reef Maps are being used by scientists, operational agencies, and various non-governmental entities in the United States and around the world at regional and local scales to:

- Study sensitivity of tropical islands to climate change and sea-level rise;
- Assess coral reef fisheries of the Pacific islands;
- Design large-scale monitoring and conservation actions (MPA implementation);
- Assess biodiversity in the Indo-Pacific (i.e., the role of reef diversity and island types in structuring biodiversity);
- Determine genetic connectivity of fish populations in the Caribbean;
- Detect reef fish spawning sites; and
- Strengthen the case for classifying certain reef areas as United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites.

Since September 2006, the Millennium Coral Reef Maps and metadata have served as the primary layer of the WorldFish Center's ReefBase on-line Global Information System (GIS) (http://www.reefbase.org/), which provides access to both the source imagery and the classified maps in the form of GIS layers. More information on the Millennium Coral Reef Maps is available online at: http://imars.marine.usf.edu/corals/. The image database can be accessed at: http://www.imars.usf.edu/MC/imagedb.html.



NASA
Image above: To create a global view of coral reefs, over 1700 images (red boxes) from the Landsat 7 spacecraft were collected for the Millennium Coral Reef Mapping Project. Natural resource managers around the world now use these images to study and protect the delicate ecosystems. Credit: University of South Florida Institute for Marine Remote Sensing.

Airborne Remote Sensing of Coral Reefs for Ecosystems Research

Scientists at NASA Ames Research Center have used NASA's airborne science assets to fly over strategic coral reef sites to collect high-resolution imagery to support coral reef ecosystem biodiversity research. The goal of this research is to better understand how light scatters and reflects in shallow aquatic ecosystems—including coral reefs, seagrass beds, and mangrove stands—so current and future remote sensing sensors and data can be optimized for ecosystem research in the coastal zone. Further, there is a need to identify the spatial resolution detection limits of remote-sensing instruments for discriminating coral assemblages. The airborne sensors consist of a high-resolution digital camera system and the Airborne Visible Infrared Imaging Spectrometer (AVIRIS), a hyperspectral sensor. NASA's airborne platforms supporting these payloads include the ER-2 and Twin Otter aircraft.

NASA's airborne missions in 2004 included the Florida Keys following Hurricane Charley, and La Parguera and Mayaguez Bays in Puerto Rico as well as much of the north, south, and west coasts of Puerto Rico, and the north and south coasts of Vieques Island. Airborne missions in 2005 included Kāneʻohe Bay on Oʻahu, Hawai`i; Culebra and Vieques Islands, Puerto Rico; La Parguera, Puerto Rico; Buck Island and the northeast coast of St. Croix, USVI; and the entire island of St. John, USVI. NASA Ames Research Center, NOAA, DOI, and university scientists conducted field sampling coincident with the overflights for atmospheric correction and validation of the AVIRIS data. In addition, field spectra were collected underwater for water column characterization and developing spectral libraries of benthic types (coral, algae, and seagrass) to relate to the AVIRIS data for creating benthic habitat maps and analysis within and between habitat spectral variations. The expected outcomes of this research for coral reef ecosystems are improved interpretation of coral reef habitat variability and biodiversity and enhanced benthic habitat classification algorithms. This effort also will contribute to studies of coastal relationships, including assessing coastal habitat composition and distribution, application of remote-sensing techniques to study land-sea interactions, and ridge-to-reef habitat assessments.
More information is available online at: http://earthscience.arc.nasa.gov/sge/coral-health/.

Regional Projects

Gulf of Mexico & Caribbean

Mapping of 2005 Bleaching Event

NASA Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) by NASA Jet Propulsion Laboratory scientists and the NASA Ames high resolution Digital Camera System (DCS)

NASA
supported by UC Santa Cruz Airborne Sensor Facility scientists with field data collection by NASA Ames researchers in collaboration primarily with researchers from the University of Puerto Rico, NOAA's Biogeography Program, and the USVI National Park Service (NPS).

For this study, visible spectrum AVIRIS light data reflecting off of the coral reef and surrounding reef bottom will be used to quantify bleaching extent and coral health.

Field measurements taken in Puerto Rico and USVI will validate and complement the airborne data. Coupled remotely sensed and in situ data will allow researchers to better understand the ecology of this region impacted by environmental events, and improve modeling of future bleaching events.

NASA deployed a team and aircraft to make remote and *in situ* observations of coral reefs sites in Puerto Rico and the USVI impacted by the coral bleaching event. Aircraft-based sensors were used to document the extent of the bleaching; gather biological and optical data on healthy, bleached, and recovering corals; and measure reef ecosystem properties to understand the dynamics of the bleaching event. These sensors provide high spectral and spatial resolution data to enhance understanding of satellite data such as the global one-kilometer Moderate Resolution Imaging Spectroradiometer (MODIS). Field measurements were collected coincident to the airborne mission in Puerto Rico and the USVI by NASA Ames Research Center, NOAA, DOI, and university scientists to validate the airborne data and quantify the complex coral reef sites with instrument measurements relating to the airborne image data. Coupling remotely sensed and *in situ* data will allow researchers to better understand the ecology of this region impacted by environmental events and improve modeling of future bleaching events. More information is available online at: http://earthscience.arc.nasa.gov/sge/coral-health/.

Pacific

A collaboration between NASA Ames Research Center and the University of Hawaii in 2005 supported AVIRIS and DCS flight lines over Kaneohe Bay, Oahu (http://earthscience.arc.nasa.gov/sge/coral-health/airborne_missions/hawaii.html). Also, in 2007 NASA Ames collaborated with Stanford University to collect AVIRIS and DCS data over sites along the Kohala Coast to initiate collaborative research from ridge-to-reef.

Western Pacific Flight Demonstration Mission

The primary goal of this proposed mission is to demonstrate the capability to deploy a small unmanned aircraft system (UAS), with sensors to the remote Western Pacific to conduct a rapid land and coastal marine resource assessment. Long term time-series measurements of islands can be used to understand the pace and severity of sea-level rise and they provide baseline information for land and littoral resource planning. A partnership is being formed between the US Forest Service - Institute of Pacific Islands Forestry and International Programs, the Federated States of Micronesia, NASA Ames Research Center, and the US Coast Guard, this mission will demonstrate the technical capability of obtaining remote sensing data in remote environments. Data products will be provided to resource managers and stake holders to evaluate the potential value to support managing ecological resources and adapting to the impacts of climate change.

International

Work conducted by the **NASA Interdisciplinary Study Coral Reef Assessment** using NASA's Earth Observing System platforms and numerical models brings together the expertise of numerical modelers and remote sensing specialists to examine larval connectivity, coral bleaching, and sediment dispersal in three large coral reef systems, including the Mesoamerican Barrier Reef System, the Great Barrier Reef, and reefs and lagoons of New Caledonia. Recent work includes reef connectivity modeling using Sea-viewing Wide Field-of-View Sensor (SeaWiFS) and Landsat data for the Mesoamerican Barrier Reef System. Modelers addressed both normal and hurricane conditions (Tang et al. 2006, Sheng et al. in press). For the Great Barrier Reef, Landsat data are used to improve understanding of the shallow bathymetry around and on top of reefs. For New Caledonia, *in situ* optical data and MODIS and Landsat images are used to refine and validate sediment concentrations modeled in the water column.

Resources Available

Datasets NASA and non-NASA:
MODIS: http://oceancolor.gsfc.nasa.gov/
SeaWiFS: http://oceancolor.gsfc.nasa.gov/SeaWiFS/
AVIRIS: http://aviris.jpl.nasa.gov/
Other NASA archived airborne imaging systems data: http://asapdata.arc.nasa.gov/

Technical Assistance

Technical assistance can be achieved via partnering for remote sensing assessments contributing to coastal zone research through NASA funded research awards.

Training/Workshops

NASA funded research awards may include workshops as a means to transfer project technology capabilities using scientific data and to facilitate communication with the relevant scientific community.

Funding Opportunities Related to Coral Reefs

NASA Research Opportunities

NASA supports the Task Force through NASA research announcements within the annual omnibus solicitation, "Research Opportunities in Space and Earth Science, ROSES" (http://nspires.nasaprs.com/). NASA-funded projects utilize global satellite, aircraft, and other airborne platforms to understand and protect our home planet. NASA solicits research in science and technology through ROSES, and utilizes the peer review process to evaluate and select research projects. NASA programs that have funded coral reef and ecological research projects include Ocean Biology and Biogeochemistry, Carbon Cycle Science, Interdisciplinary Science, and the Biodiversity Programs.

Fellowships Offered

NASA offers fellowships for graduate students and new investigators, as well as educators and outreach personnel. For more information: http://education.nasa.gov/edprograms/fellowgrants/index.html.

Earth System Science Fellowship Program

NASA announces graduate student fellowships for persons pursuing Master of Science (M.Sc.) or Doctoral (Ph.D.) degrees in Earth System Science and related disciplines. The purpose of

NASA
NASA's Earth System Science (ESS) Fellowship Program is to ensure continued training of interdisciplinary scientists to support the study of the Earth as a system. NASA places particular emphasis on the applicant's ability and interest in pursuing academic training and research using observations and measurements from NASA's Earth orbiting satellites, and in developing inter- or cross-disciplinary research about the Earth system that is not currently emphasized in the research and development portfolio of NASA's Science Mission Directorate (SMD). For more information see solicitations under: http://nspires.nasaprs.com/external/.

Graduate Student Research Program
The NASA Graduate Student Researchers Program (GSRP) is an Agency-wide fellowship program (also called GSRP Training Grants in what follows) for graduate study leading to masters or doctoral degrees in the fields of science, mathematics, and engineering related to NASA research and development. This twelve month award strongly encourages a research experience at the NASA center extending the GSRP Fellowship. For more information see: http://fellowships.hq.nasa.gov/gsrp/nav/.

NASA Postdoctoral Program
The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly talented national and international individuals to engage in ongoing NASA research programs at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institution. These one- to three-year Fellowship appointments are competitive and are designed to advance NASA's missions in space science, earth science, aeronautics, space operations, exploration systems, and astrobiology. For more information see: http://nasa.orau.org/postdoc/.

Publications and Documents

An Advanced Plan for NASA's Ocean Biology and Biogeochemistry Research
http://oceancolor.gsfc.nasa.gov/DOCS/OBB_Report_5.12.2008.pdf.

National Science Foundation

The mission of the National Science Foundation is "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…" NSF is an independent agency of the U.S. government responsible for advancing science and engineering. NSF plays a critical role in supporting fundamental research, education and infrastructure (i.e. laboratories, research vessels, instrumentation) at colleges, universities, and other organizations throughout the country. NSF's broad support for basic research provides opportunities for discovery in many fields and provides mentoring opportunities to facilitate the development of emerging scientists and engineers.

As a partner in achieving the mission of the USCRTF, the NSF supports a substantial portion of the federally-funded fundamental research important to the basic understanding of:

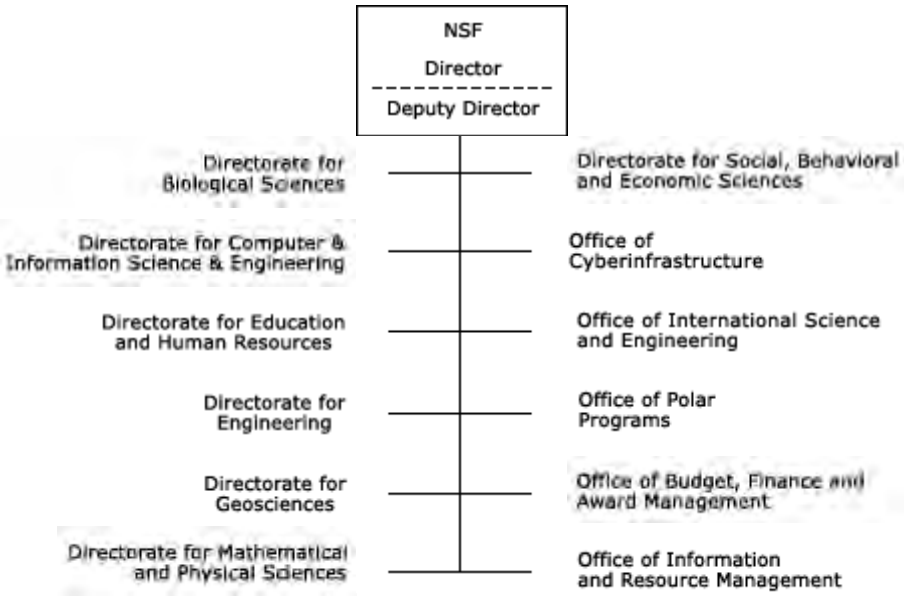
- corals (physiology, biochemistry, symbioses, environmental stress, disease, reproduction, population genetics and evolution),
- coral reefs today and in the past (geology, paleo-environmental history, ocean acidification),
- coral reef ecosystems (living marine resources, community dynamics, marine protected areas, biodiversity processes, long-term ecological research), and
- the infrastructure used to study reef systems and environments.

Research supported includes (1) laboratory studies; (2) field experimentation and observation world-wide; (3) interdisciplinary studies coupling biology and ecology to ocean physical and chemical processes, and climate, and (4) simulation and predictive modeling of the dynamics of coral reef systems.

There is great value to the NSF and the science community in participation in USCRTF. NSF participation and activities continue to highlight the importance of fundamental research in achieving the overall goals of the USCRTF and identifying opportunities for interagency cooperation and coordination in coral reef research.

Organizational Structure

Many parts of the NSF participate in the overall USCRTF effort by way of the support for scientific research and education projects. The majority of support is provided through a variety of Programs within the Directorates of Geosciences (ocean, earth and atmospheric sciences), Biological Sciences, Education and Human Resources, and the Office of International Science and Education.



Projects

Most funding for the research on coral and coral reefs is in the form of grants to scientists on behalf of their institutions. These range from shorter-term (3 year) grants to individual scientists, to large and long-term interdisciplinary projects involving many institutions and investigators. The amount varies from year to year contingent upon the submittal and merit review of proposals. Funding levels are in excess of $15 million per year. A few of the many research themes and specific projects include:

- Long-term Ecological Research at U.C. Berkeley's Gump Research, which provides significant opportunities for researchers to study population dynamics of coral reefs and qualitative responses of coral reefs to different types of environmental change.

- Long term studies improving research opportunities, infrastructure and instrumentation in the US Virgin Islands relating to biodiversity, ecosystem connectivity and biocomplexity-related coastal oceanography. Results of these awards will improve the research capability of UVI and visiting researchers studying Caribbean coral reefs.

- Interdisciplinary times-series studies of coral reef structures and reef-associated community composition in the eastern Pacific in response to El Nino-Southern Oscillation climate disturbances.

- The development of programs to address the scientific and technical needs of the U.S.-Affiliated Pacific Islands. The program targets education through the community colleges of the Pacific Islands with regionally relevant curriculum development, professional

development of faculty and secondary school teachers, and internships and field experiences for faculty, teachers, and students.

- Origins of high Indo-West Pacific marine biodiversity and the role of allopatric divergence in marine environments. For example, the Indo-Malay-Philippine Archipelago is a proposed project aiming to forge new partnerships that can transform this epicenter of marine biodiversity into an epicenter of marine research and education.

- Determining whether coral symbioses have the capacity and ecological context to adapt to climate change by modifying their endosymbiotic communities through their interactions with pools of free-living diversity in the coral reef environment.

- Development of more rapid and efficient way to get baseline estimates of calcification rates in corals.

- Populations of corals living in the eastern Pacific Ocean which are especially vulnerable to climate change.

- Disease in sponges in coral reef ecosystems.

- Invasive species to the Caribbean and Western Tropical Atlantic Ocean – the Pacific Lionfish.

Resources Available

Funding Opportunities

NSF supports research primarily by issuing limited-term grants – approximately 10,000 new awards per year, with an average duration of three years – to fund specific research proposals judged the most promising by a rigorous and objective merit-review system. Research proposals are usually unsolicited and reviewed in competition with other proposals addressing similar disciplinary activities. Awards go to individuals or small groups of investigators through their organization or institution. A very small proportion of proposals sent to NSF are in response to an announcement of opportunity for a special initiative such as Carbon and Water in the Earth System and Long-Term Ecological Research. Special initiatives have a broad range of goals and may include social science, mathematics, geosciences, biology and other disciplines in each proposal.

Through the grant review process, NSF-supported projects targeted to advancing knowledge of coral reef ecosystems generally fall into the area of “strategic research” in the National Action Plan (NAP) of the USCRTF. Most of these research projects are supported by the Division of Ocean Sciences or the Division of Environmental Biology. Themes that have emerged from awards include symbiosis, nutrient cycling, ocean acidification, and population connectivity. Improving and fostering long-term research stations is also priority prevalent in recent and past awards. Research supported by NSF provides a better understanding of the functioning of coral reef communities, which can provide a biological basis for management activities and benefits

NSF
many goals of the NAP especially marine protected areas, sustainable fishing, restoration, social and economic development, and international collaborations.

Fellowships and Student Opportunities

Partnerships for International Research and Education Awards

This program provides educational opportunities for Undergraduate Students, Graduate Students, Postdoctoral Fellows and seeks to catalyze a high level of international engagement in the U.S. science and engineering community by supporting innovative, international research and education collaborations.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12819&org=OISE&from=home

Acronyms

AS	American Samoa
ASNIE	Assistant Secretary of the Navy for Installations and Environment
ATRIS	Along Track Reef Imaging System
AVIRIS	Airborne imaging systems include the Airborne Visible/Infrared Imaging Spectrometer
BLM	Bureau of Land Management
CBD	Convention on Biological Diversity
CEAP	Conservation Effects Assessment Project
CGP	Construction General Permit
CIG	Conservation Innovation Grants
CIP	Capital Investment Program
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CNMI	Commonwealth of the Northern Mariana Islands
CO_2	Carbon dioxide
CoRIS	Coral Reef Information System
CRCA	Coral Reef Conservation Act
CRCP	Coral Reef Conservation Program
CREMP	Coral Reef Evaluation and Monitoring Program
CRES	Coral Reef Ecosystems Studies
CSCOR	Center for Sponsored Coastal Ocean Research
CSREES	Cooperative State Research, Education and Extension Service
CTA	Conservation Technical Assistance Program
CTI	Coral Triangle Initiative
CWA	Clean Water Act
DENIX	DOD Environmental Information and Exchange
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
DOS	U.S. Department of State
EAR	Electronic Acoustic Recorders
EAARL	Experimental Airborne Advanced Research Lidar
EEZ	Exclusive Economic Zone
EO	Executive Order
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERCD	Engineer Research and Development Center
ERP	Ecological Research Program
ESA	Endangered Species Act
EWP	Emergency Watershed Program
FAS	Freely Associated States (Republic of Palau, Federated States of Micronesia, Republic of the Marshall Islands)
FGBNMS	Flower Garden Banks National Marine Sanctuary
FISH	Fisheries Improved for Sustainable Harvest
FKNMS	Florida Keys National Marine Sanctuary
FOTGs	Field Office Technical Guides

FSM	Federated States of Micronesia
FWC	Florida Fish & Wildlife Conservation Commission
FWS	Fish and Wildlife Serve
GBRMPA	Australian Great Barrier Reef National Park Authority
GIS	Geographic Information System
GOM	Gulf of Mexico
GPA	Global Program of Action
GPS	Global Positioning System
GSRP	Graduate Student Researchers Program
HGM	Hydrogeomorphic
I&M	Inventory and Monitoring (Networks)
ICM	Integrated Coastal Management
ICRI	International Coral Reef Initiative
IRT	Innovative Readiness Training
IUCN	International Union for the Conservation of Nature
IWR	Institute for Water Resources
JICMS	Joint Institute for Caribbean Marine Studies
LAS	Local Action Strategy
LCC	Large capacity cesspools
LTER	Long-Term Ecological Research
MERC	Middle East Regional Cooperation
MIO	Marine Information Object
MMS	Minerals Management Service
MODIS	Moderate Resolution Imaging Spectroradiometer
MPA	Marine Protected Area
MPRSA	Marine Protection, Research, and Sanctuaries Act
MREC	Marine Research and Education Center
MSA	Magnuson Stevens Fishery Conservation and Management Act
MSRA	Magnuson Stevens Fishery Conservation and Management Reauthorization Act
NAP	National Action Plan
NASA	National Aeronautics and Space Administration
NAVOCEANO	Naval Oceanographic Office
NCCR	National Coastal Condition Report
NCRI	National Coral Reef Institute
NDSEG	National Defense Science and Engineering Graduate
NEPA	National Environmental Policy Act
NNEMS	National Network for Environmental Management Studies
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NEPA	National Environmental Policy Act
NIWR	National Institute for Water Resources
NMN	Marine National Monument
NODC	National Oceanographic Data Center
NPP	NASA Postdoctoral Program
NRPC	National resource Program Center
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
NWHI	Northwestern Hawaiian Islands
NWRS	National Wildlife Refuge System

OBB	Ocean Biology and Biochemistry
OCRB	Ocean and Coastal Resources Branch
OCPD	Oceans and Coastal Protection Division
OCS	Outer Continental Shelf
OCSLAA	Outer Continental Shelf Lands Act
OEMM	Offshore Energy and Minerals Management
OIA	Office of Insular Affairs
ONRM	Office of Natural Resources Management
OWOW	Office of Wetlands, Oceans, and Watersheds
P2	Pollution Prevention
PARC	Palmyra Atoll Research Consortium
PIMPAC	Pacific Islands Marine Protected Area Community
PIRO	Pacific Islands Regional Office
POC	Point of Contact
PRIA	Pacific Remote Islands Areas
PRIME	Plastics Removal in Marine Environment
PRIWG	Pacific Region Interagency Working Group
PSRPA	Park System Resource Protection Act
RAMP	Reef Assessment and Monitoring Program
REPI	Readiness and Environmental Protection Initiative
RGLs	Regulatory Guidance Letters
RHA	Rivers and Harbors Act
RMI	Republic of the Marshall Islands
ROV	Remotely Operated Vehicle
SeaWiFS	Sea-viewing Wide Field-of-View Sensor (NASA)
SEFCRI	Southeast Florida Coral Reef Initiative
SEFSC	Southeast Fisheries Science Center
SERDP	Strategic Environmental Research and Development Program
SFCN	South Florida/Caribbean Inventory and Monitoring Network
SPAW	Specially Protected Areas and Wildlife
SPREP	South Pacific Regional Environment Program
TPDES	Territorial Pollution Discharge Elimination System
UAS	Unmanned Aircraft System
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	UN Framework Convention on Climate Change
USACE	U.S. Army Corps of Engineers
USAID	U.S. Agency for International Development
USCG	U.S. Coast Guard
USCRTF	U.S Coral Reef Task Force
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USVI	U.S. Virgin Islands
VIP	Volunteers in Parks
WHIP	Wildlife Habitat Incentives
WOTS	Water Operations Technical Support
WQPP	Water Quality Protection Program
WRAPS	Waste Reduction Afloat Protects the Sea
WRI	World Resources Institute
WRP	Wetlands Reserve Program