

***THE NATIONAL ACTION PLAN
TO
CONSERVE CORAL REEFS***

United States Coral Reef Task Force

March 2, 2000

Washington, D.C.

The United States Coral Reef Task Force was established by President Clinton in June 1998 through Executive Order #13089 to lead U.S. efforts, both domestically and internationally, to protect, restore and sustainably use coral reef ecosystems. Chaired by the Secretary of the Interior and the Secretary of Commerce, the Task Force is composed of the heads of 11 federal agencies and the Governors of 7 states, territories or commonwealths with responsibilities for coral reefs.

For more information on the Task Force, this document, or on coral reefs, please visit the Task Force web site at <http://coralreef.gov/>.

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PREFACE

The world's coral reefs and associated seagrass and mangrove habitats are in serious jeopardy, threatened by an increasing array of over-exploitation, pollution, habitat destruction, invasive species, disease, bleaching and global climate change. The rapid decline of these ancient, complex and biologically diverse marine ecosystems has significant social, economic and environmental impacts here in the U.S. and around the world.

In response to this growing global environmental crisis, President William Jefferson Clinton issued the Coral Reef Protection Executive Order 13089 on June 11, 1998 (Appendix A). The Executive Order established the *United States Coral Reef Task Force* (CRTF), which includes the major federal agencies responsible for aspects of coral reef conservation, plus our state and territorial partners (Appendix B). Through the policies set forth in the Executive Order, the federal government was directed to strengthen its stewardship of the nation's reef ecosystems and coral reefs around the world.

At its second meeting in March 1999, the CRTF directed six Working Groups to develop a detailed, long-term strategy for implementing the Executive Order. Working Group members were drawn from federal, state and territorial governments. In addition, the Working Groups and the CRTF received input from a variety of non-governmental sources including academia, environmental organizations and the private sector. The Working Groups' draft plans were disseminated as separate reports and synthesized in a Draft National Action Plan presented formally to the Task Force and the public for review and comment at the third meeting in November 1999 in St. Croix, USVI. At that meeting, a seventh Working Group on outreach and education was formed.

The *National Action Plan to Conserve Coral Reefs* represents the collective experience and commitment of a large number of coral reef professionals inside and outside the government. Drafts were modified extensively based on significant input from stakeholders, resource management agencies and the American public. As a result, this Action Plan represents a *true reflection of the national commitment* by the Task Force's member agencies, conservation partners and the public to reverse the decline of coral reefs around the world.

On behalf of the U.S. Coral Reef Task Force, we are pleased to present the *National Action Plan to Conserve Coral Reefs* to the President, the Vice President, the White House Council on Environmental Quality, the Congress and the American people. This document lays out a carefully considered, science-based road map to healthy coral reefs for generations to come -- the ultimate intent of Executive Order 13089. This significant challenge cannot be met by governmental action alone. Rather, it will require both concerted efforts and sustained collaboration by many public and private entities concerned with the fate of coral reefs worldwide.

Toward that end, the National Action Plan presents priority recommendations to be undertaken by federal, state and territorial governments, and our non-governmental and international conservation partners. The proposed actions range widely in scope, complexity, cost and duration, reflecting the nature of the conservation challenge we face. All are considered important elements of the overall strategy to save the world's reefs. If fully implemented, these bold actions will help ensure that coral reefs continue to provide valuable ecological, social and economic services to future generations – and that their beauty, diversity and power to inspire will remain undiminished.

The Coral Reef Task Force identified two *fundamental themes for immediate and sustained national action*:

- *understand coral reef ecosystems* and the natural and anthropogenic processes that determine their health and viability;
- *quickly reduce the adverse impacts* of human activities on coral reefs and associated ecosystems.

Within these broad themes, we developed 13 integrated conservation strategies to comprehensively meet the most pressing challenges facing reefs today. In addition to these tangible field-based actions, the Coral Reef Task Force identified a consensus suite of *core principles* to guide the government's future actions to ensure an integrated, consistent, sustainable and inclusive approach to conserving coral reefs.

Our intent was not to create a static plan that would become obsolete in a few years. Instead, this large and diverse group designed the National Action Plan as a dynamic *road map* for achieving the goals of the Executive Order: *to conserve and protect the coral reefs of the U.S. and the world*. Consequently, we view this Action Plan as a *living document*. It is intended to be revisited, evaluated and updated regularly as conditions on the world's coral reefs change – hopefully for the better. As an integral part of that iterative process, the member agencies of the Coral Reef Task Force will develop and present implementation plans and annual reports detailing their efforts to execute specific portions of this plan. These summaries will be made accessible to the public on the CRTF web site: <http://coralreef.gov>.

Perhaps as important as the specific actions presented here is the spirit of cooperation and shared purpose evidenced by the Coral Reef Task Force member agencies throughout this intensive planning processes. Coral reef experts from inside and outside the government put aside institutional and personal interests to focus on the common goal and responsibility invested in us through the Executive Order 13089: to conserve these remarkable ecosystems for future generations. We believe we have succeeded in the first essential task of that challenge – creating the National Action Plan to Conserve Coral Reefs. However, the publication of this Action Plan marks the beginning, not the end of our real work. Now is the time to turn these progressive ideas into action to save our coral reefs.

Bruce Babbitt
Secretary of the Interior

William M. Daley
Secretary of Commerce

EXECUTIVE SUMMARY

Coral reefs are among the most diverse and biologically complex ecosystems on earth. These *rainforests of the sea* provide economic and environmental services to millions of people as areas of natural beauty and recreation, sources of food, jobs, chemicals, pharmaceuticals, and shoreline protection. Now under threat from multiple stresses that are overwhelming their natural resilience, coral reefs are deteriorating worldwide at alarming rates. An estimated 10% of the world's reefs have already been lost and 60% are threatened by bleaching, disease and a variety of human activities including shoreline development, polluted runoff from agricultural and land-use practices, ship groundings, over-harvesting, destructive fishing, and global climate change. The trend in coral reef health is downward, and these ancient ecosystems are in peril.

This document presents the United States' collective response to this crisis: *The National Action Plan to Conserve Coral Reefs*. The Action Plan was produced by the Working Groups of the United States Coral Reef Task Force in response to its request for a cohesive national strategy to implement Executive Order 13089 on Coral Reefs (Appendix A). These actions were developed in consultation with a variety of stakeholders and cover the spectrum of coral reef conservation from mapping, monitoring, management and research, to education and international cooperation (Appendix B). Collectively, these actions are intended to provide a comprehensive road map for federal, state, territorial and local action to reverse the worldwide decline and loss of coral reefs. This is a living document, intended by its authors to be revisited and revised regularly, and to be augmented by agency implementation plans and an annual report from each CRTF member agency summarizing significant issues and accomplishments related to coral reef conservation.

Strategies to Conserve Coral Reefs

Two fundamental themes will frame the Coral Reef Task Force's conservation actions:

- **Understand Coral Reef Ecosystems** – by conducting comprehensive mapping, assessment and monitoring of coral reef habitats; supporting strategic research on regional threats to coral reef health and the underlying ecological processes upon which they depend; and incorporating the human dimension into conservation and management strategies.
- **Reduce The Adverse Impacts Of Human Activities** – by creating an expanded and strengthened network of federal, state and territorial coral reef Marine Protected Areas; reducing the adverse impacts of extractive uses; reducing habitat destruction; reducing pollution; restoring damaged reefs; strengthening international activities; reducing the impacts of international trade in coral reef species; improving governmental accountability and coordination; and creating an informed and engaged public for coral reef conservation.

Core Conservation Principles

In addition to these specific action strategies, the Coral Reef Task Force member agencies have developed a suite of 8 *core principles* to guide their future endeavors to implement the Executive Order as well as the National Action Plan:

- to adopt a **science-based ecosystem approach** to coral reef conservation that recognizes and builds upon important linkages among adjacent and remote habitats associated with coral reefs.
- to employ **adaptive management** approaches that track and respond to environmental change and emerging threats.
- that scientific uncertainty shall not prevent taking **precautionary measures** as appropriate to protect coral reefs.
- to incorporate the **human dimension** into coral reef conservation strategies by ensuring that management measures reflect, and are sensitive to the local socio-economic, political and cultural environment, and that they build an informed public engaged in choosing alternatives to activities that harm coral reefs.
- to apply **marine zoning - including marine protected areas and no-take ecological reserves** - in order to protect and replenish coral reef ecosystems by minimizing harmful human impacts and user conflicts in important habitats.
- to fully and proactively use **existing management authorities and programs** at the federal, state and territorial levels, and develop, where needed, new legal mechanisms that protect, restore and enhance coral reef ecosystems.
- to develop and support strong **domestic partnerships** among governmental, private and scientific interests to meet the complex cross-jurisdictional challenges of coral reef conservation.
- to provide global leadership to **reduce global threats** to coral reefs through international technical and development assistance, capacity building and collaboration.

I. CORAL REEFS — ECOSYSTEMS AT RISK

A. REEFS ARE INVALUABLE COASTAL ECOSYSTEMS

Coral reefs, and their associated sea grass and mangrove habitats, are among the most diverse and valuable ecosystems on earth. Such reef systems are storehouses of immense biological wealth and provide economic and environmental services to millions of people as shoreline protection, areas of natural beauty, recreation and tourism, and sources of food, pharmaceuticals, jobs, and revenues. According to one estimate, *these rainforests of the sea* provide services worth about \$375 billion each year -- a staggering figure for an ecosystem which covers less than one percent of the earth's surface.

The United States has a significant national interest in protecting our nation's coral ecosystems. U.S. coral reefs cover approximately 17,000 square kilometers of our Exclusive Economic Zone (EEZ). Over ninety percent of U.S. reefs are in the Western Pacific (i.e., Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands); the remainder are located off Florida, Texas, and the U.S. islands in the Caribbean (i.e., Puerto Rico and the U.S. Virgin Islands). In addition, reef habitats play a central cultural role among many U.S. islands, where community-based conservation, subsistence fisheries, and protected areas have been successfully managed for generations.

The United States also has strong political and economic interests in protecting international coral reef ecosystems. Healthy marine ecosystems are critical to U.S. diplomatic and development strategies to promote economic and food security, social stability, democratic governance, improved human health, disaster and climate change mitigation, and biodiversity conservation in many countries. Coral reef ecosystems have great economic, social and cultural importance to many nations and entire regions. These extremely valuable ecosystems constitute the economic base and future hope for sustained development in many countries, particularly small island nations.

In addition, the ecological health and economic benefits of U.S. coral reefs are directly and intimately connected with those of reef habitats in other countries. Currents that bathe the Florida Keys originate in the wider Caribbean and along the coast of Central America. These water masses carry essential larvae and juvenile corals, fish, and other invertebrates that replenish our reefs. They can also carry potentially harmful pollutants and diseases. Similarly, the coral reefs of many of the U.S. Pacific territories are connected to those of other Indo-Pacific reefs, sharing many of the same coral reef species. Conserving coral reefs is a challenge of global dimensions.

Coral reefs provide a vast array of valuable services to the nation and the world. Chief among these are:

- *Tourism* -- The tourism industry is one of the fastest growing sectors of the global economy. U.S. reefs are a major destination for snorkelers, scuba divers, recreational fishers, boaters and sun seekers. Diving tours, fishing trips, hotels, restaurants, and other businesses based near reefs provide millions of jobs and support many regional economies in the U.S, contributing billions of dollars in tourism-dependent revenue annually. In the Florida Keys, for example, tourism related to coral reef ecosystems produces over \$1.2 billion per year. Similar trends are seen internationally, where ecotourism to coral reef destinations is emerging as a major economic sector in many countries.
- *Fishing* -- Over 50% of all federally managed fisheries species depend on coral reefs for part of their life cycle. The annual dockside value of commercial U.S. fisheries from coral reefs is over \$100 million. The annual value of reef-dependent recreational fisheries probably exceeds \$100 million per year. In developing countries, coral reefs contribute about one-quarter of the total fish catch, providing food to an estimated one billion people in Asia alone.
- *Coastal Protection* -- Coral reefs buffer adjacent shorelines from wave action and prevent erosion, property damage and loss of life. Reefs also protect the highly productive mangrove fisheries and wetlands along the coast, as well as ports and harbors and the economies they support. Globally, half a billion people are estimated to live within 100 kilometers of a coral reef and benefit from its production and protection.
- *Biodiversity* -- Reefs support at least a million described species of animals and plants, including about 4,000 documented species of fish and 800 species of hard corals. Another 8 million coral reef species are estimated to be as yet undiscovered. In many ways, coral reefs rival and surpass tropical rainforests in their natural wonder and biological diversity and complexity. This unparalleled biodiversity holds great promise for natural products derived from reef dwelling organisms, such as the many pharmaceuticals being developed from coral reef animals and plants as possible cures for cancer, arthritis, human bacterial infections, viruses, and other diseases. In fact, reefs are often predicted to be the primary source of natural compounds for new medicines in the 21st century.
- *Natural Heritage* -- Coral reefs are an important part of our natural heritage, rivaling the longevity or complexity of some treasured land-based resources like old growth forests, Joshua trees and Sequoias. For example, a well-developed reef may be the manifestation of thousands of years of incremental accretion by its resident coral colonies, sometimes growing only millimeters each year. Many coral species have no known limit on colony size or age and may continue growing indefinitely in favorable habitats. As a result, some of the largest individual coral colonies found on U.S. reefs today were almost surely alive centuries ago, long before modern times and its associated environmental pressures. The scientific, aesthetic and conservation value of such ancient animals and their complex biogenic habitats is unparalleled in the world's oceans, and indeed on land as well. These are truly living museums of the world's marine biological diversity.

B. REEFS ARE IN PERIL

Ironically, the value of coral reefs to the nation is matched only by their vulnerability to harmful environmental changes, particularly those resulting from human activities. Present estimates are that 10% of all coral reefs are degraded beyond recovery; 30% are in critical condition and may die within 10 to 20 years, particularly those near human populations; and, if current pressures continue unabated, another 30% may perish completely by 2050.

The growing number of anthropogenic threats to coral reefs has been exhaustively documented and evaluated by several expert groups over the past decade. Based on these excellent reports, the Coral Reef Task Force identified 8 specific and widely accepted threats as being particularly important, and tractable, for immediate action by its member agencies and our non-governmental partners:

- **pollution**, including eutrophication and sedimentation from poor or overly intensive land use, chemical loading, oil and chemical spills, marine debris and invasive alien species.
- **over-fishing and over-exploitation** of coral reef species for recreational and commercial purposes, and the collateral damage and degradation to habitats and ecosystems from fishing activities.
- **destructive fishing practices**, such as cyanide and dynamite fishing that can destroy large sections of reef.
- **dredging and shoreline modification** in connection with coastal navigation or development.
- **vessel groundings and anchoring** that directly destroy corals and reef framework.
- **disease outbreaks** that are increasing in frequency and are affecting a greater diversity of coral reef species.
- **global climate change** and associated impacts including increased coral bleaching, mortality, storm frequency, and sea level rise.

The global degradation and demise of coral reef ecosystems imperils the communities that depend upon them for services, jobs, food and protection

C. THE GLOBAL RESPONSE TO THE CORAL REEF CRISIS

The International Coral Reef Initiative. The recent global decline in coral reef health has galvanized an international movement to save these invaluable ecosystems. The United States has played an integral role in these efforts since their inception. In 1994, the United States was instrumental in establishing and supporting the International Coral Reef Initiative (ICRI) and its

Framework for Action and Call for Action. In initiating ICRI, the Governments of the United States, Australia, France, Jamaica, Japan, The Philippines, Sweden, and the United Kingdom recognized the importance of stopping and reversing the global degradation of coral reefs and related ecosystems, and preserving marine biodiversity.. The United States provided critical support to ICRI and its Global Coral Reef Monitoring Network (GCRMN), and served as the first ICRI Secretariat. In 1998, the United States joined with other countries in supporting ICRI's *Renewed Call to Action*, which represented a revitalized global pledge to strengthen international action to address the decline of coral reefs.

National Action. The United States also worked actively to address the coral reef crisis through the domestically focused U.S. Coral Reef Initiative. Federal agencies, State, local, territorial, and commonwealth governments, non-governmental organizations, and commercial interests have worked together to design and implement management, education, monitoring, research and restoration efforts to conserve and sustainably use coral reef ecosystems.

During 1997, the International Year of the Reef, the U.S. joined many other nations in activities to raise public awareness about the importance of conserving coral reefs and to facilitate actions to protect coral reef ecosystems. On October 21, 1997, the 105th Congress passed House Concurrent Resolution 8, recognizing the significance of maintaining the health and stability of coral reef ecosystems. The year 1998 was declared to be the International Year of the Ocean to raise public awareness and increase actions to conserve and use in a sustainable manner the broader ocean environment, including coral reefs.

On June 11, 1998, as part of the National Ocean Conference, President William Jefferson Clinton signed Executive Order 13089 on Coral Reef Protection (64 Fed. Reg. 323701, and Appendix A), which recognized the importance of conserving coral reef ecosystems and established the U.S. Coral Reef Task Force under the joint leadership of the Departments of the Interior and Commerce (Appendix B). The Coral Reef Executive Order directs Federal agencies whose actions may affect United States coral reef ecosystems to take steps to protect and enhance the conditions of such ecosystems, and requires the Task Force to develop a comprehensive plan for protection, restoration and sustainable use of U.S. coral reefs. The Executive Order also highlights international trade and protection of coral reef species with implementation of appropriate strategies and actions to promote conservation and sustainable use of coral reef resources worldwide.

After the first CRTF meeting in Florida in October 1998, the Task Force created 6 Working Groups organized around broad themes in coral reef conservation. The Working Groups comprised experts in the science, policy and conservation of coral reef ecosystems, drawn from all levels of government and the private sector. A detailed list of participants in each working Group can be found on the CRTF web page at <http://coralreef.gov>. During the third CRTF meeting in November 1999 in St. Croix, a seventh Working Group was formed to address outreach and education.

The 7 Working Groups and their Chairs are:

- Coastal Uses Working Group (J. Benoit, DOC/NOAA)
- Water and Air Quality Working Group (C. Fox, USEPA)
- Mapping and Information Synthesis Working Group (M. Monaco, DOC/NOAA, J. Williams, DOI/USGS, and G. Feldman, NASA)
- Ecosystem Science and Conservation Working Group (K. Koltjes, DOI)
- International Working Group (B. Yeager, DOS, and D Hales, USAID)
- All U.S. Islands Working Group (M. Ham, Guam, followed by L. Peau, American Samoa)
- Outreach and Education Working Group (A. Clark, Hawai'i, M. Stout, DOC/NOAA, and H. Hankin, DOA)

D. THE NATIONAL ACTION PLAN TO CONSERVE CORAL REEFS

Working Group Reports. To fulfill the mandate of Executive Order 13089, the Task Force charged the Working Groups with developing a recommended strategy for specific aspects of coral reef conservation. Each Working Group produced at least one – and in some cases several - detailed reports and implementation plans evaluating conservation needs and threats to coral reefs and recommending specific actions to address them. These documents were presented for public review and comment in November 1999 at the third meeting of the Coral Reef Task Force in St. Croix and can be found on the CRTF's web site: <http://coralreef.gov>.

Coastal Uses Working Group Summary Report

Sub-group reports include:

- *Fishing Pressures*
- *Coastal Development And Shoreline Modification*
- *Vessel Impacts.*

Draft Recommendations of the Water & Air Quality Working Group

- *Assessment, Criteria and Standards*
- *Physical Impacts to Coral Reefs*
- *Pollution Problems - Sediments*
- *Pollution Problems - Nutrients*
- *Pollution Problems - Other Chemical and Biological Pollutants*
- *Education and Outreach Activities*

Coral Reef Mapping Implementation Plan, by the Mapping and Information Synthesis Working Group.

Ecosystem Science and Conservation Working Group, Draft Implementation Plan.

Sub-Group Reports include:

- *Building a National System of Marine Protected Areas for Coral Reefs*
- *Coral Reef Protected Areas: A Guide to Management*
- *Coral Disease and Health Consortium*
- *Draft Implementation Plan for Long-term Regional Research on Coral Reef Ecosystems*
- *A National Program to Assess and Monitor Coral Reefs*
- *The Hawai'i Coral Reef Emergency Response Team*

International Working Group: Draft Report to the United States Coral Reef Task Force

Sub-Group Reports include:

- *Support To International Initiatives And Diplomatic Efforts*
- *Wider Caribbean Region: Report of Subgroup*
- *South East Asia Region: Report of Subgroup*
- *Pacific Region: Report of the Subgroup*
- *Unprecedented Coral Bleaching and Mortality*
- *International Trade in Coral and Coral Reef Species: Report of the Trade Sub-Group*

Outreach and Education Strategic Plan – Draft

All U.S. Islands Coral Reef Initiative Strategy

Sub-group reports (chapters) include:

- American Samoa
- Commonwealth of the Northern Mariana Islands
- Guam
- Hawai'i
- Puerto Rico
- U.S. Virgin Islands

The Integrated National Action Plan. The Working Group reports developed an impressive array of potential responses to the growing coral reef crisis. Over time, a number of common themes and needs began to emerge across groups (e.g., the need for research, for improved permitting, for reduced extractive uses, and for Marine Protected Areas). As a result, the CRTF and the Working Groups opted to integrate and synthesize their collective recommendations into a single plan, the comprehensive framework for concerted action. This integrated document, *The CRTF's National Action Plan to Conserve Coral Reefs*, organizes the Working Group recommendations around two primary *themes* covering 13 distinct conservation *strategies*. These themes and strategies are:

Understand Coral Reef Ecosystems –

- *create comprehensive maps of all U.S. coral reef habitats*
- *conduct long-term monitoring and assessments of reef health and trends*
- *support strategic research to respond to the major threats to reef health*
- *incorporate the human dimension into coral reef conservation strategies*

Reduce the Adverse Impacts of Human Activities –

- *create an expanded network of coral reef Marine Protected Areas and No-take Reserves;*
- *reduce impacts of extractive uses*
- *reduce habitat destruction*
- *reduce pollution*
- *restore damaged reefs*
- *reduce global threats to coral reefs*
- *reduce impacts from international trade in coral reef species*
- *improve Federal accountability and coordination*
- *create an informed public for coral reef conservation*

E. USING THIS DOCUMENT

The National Action Plan to Conserve Coral Reefs addresses a complex problem with complex solutions: mobilizing the public and private forces to save coral reefs. This document reflects that complexity, it is designed to provide varying levels of detail to inform different audiences and end users. For example, the Preface and Executive Summary present a general overview of the CRTF's long-term goals and approach. A more thorough understanding of the CRTF's rationale, core operating principles and key conservation strategies and objectives can be found in Parts I-III, respectively. Additional detail can be found in the attached Project Tables (Appendix C) which lay out the comprehensive road map for action over several years, with individual Action Items corresponding directly to specific Working Group recommendations. Additional details and insight can be found in the relevant Working Group reports, which are cited in the Project Tables of Appendix C. All are available to the public on the CRTF web page: <http://coralreef.gov>.

F. CONSTRAINTS ON FEDERAL AGENCY ACTION

Executive Order 13089 presents a formidable call to action for federal agencies, and this National Action Plan responds with recommendations for proactive and decisive governmental action to reverse the worldwide decline of reefs. Taken together, the CRTF's Action Plan represents a comprehensive national strategy for meeting the conservation challenges facing coral reefs today. It is important to understand, however – particularly for the non-governmental reader – that there are legal and practical limits to what can be done in the short term.

Resource Constraints. This action plan assumes the CRTF agencies will work cooperatively wherever their missions, authorities and resources allow to implement the actions laid out in this plan. All actions are subject to appropriations and budgetary constraints in the context of all Administration priorities. Moreover, agency priorities from year to year will reflect emerging threats and needs, as well as new technologies available to meet those challenges.

Legal and Policy Constraints. In addition to fiscal constraints on federal action, all federal agency actions proposed in this plan to protect coral reefs must conform to legal and policy limits set forth in domestic policy and international law. These include: applicable legal authorities; available appropriations; intergovernmental agreements between federal, state and territorial entities; international laws, rules and standards, including the Law of the Sea Principles as reflected in the United Nations Convention on the Law of the Sea; prior uses required by law; national security; and, Presidential directives.

Annual Priorities. Recognizing the fluid nature of the challenge we face, and our collective means to meet it, the CRTF has opted to develop the nation's comprehensive strategy – or road map - for permanently conserving coral reefs, without specifying agency priorities beyond Fiscal Year 2001. Consequently, the Action Plan indicates which agencies intend to participate in specific conservation objectives for FY00 and 01. Additional information on specific projects planned by each CRTF agency will be presented in the implementation plans required by E.O. 13089 to be developed by June 2000. These plans will be updated and made available annually as part of the CRTF's implementation of the *National Action Plan to Conserve Coral Reefs*. In essence, the U.S. Coral Reef Task Force intends this Action Plan to be a *living document*, which will be revisited regularly by the CRTF member agencies, and the public, to evaluate the need for changes in light of future trends in coral reef health.

II. CORE PRINCIPLES FOR CORAL REEF CONSERVATION

During the development of the Action Plan, a number of philosophical and methodological approaches to coral reef conservation emerged from the Working Groups' deliberations. In effect, these fundamental concepts represent a set of core guiding principles to ensure that the world's coral reefs are conserved for future generations. To that end, the U.S. Coral Reef Task Force commits:

- to adopt a **science-based ecosystem** approach to coral reef conservation that recognizes and builds upon important linkages among adjacent and remote habitats associated with coral reefs.
- **to employ adaptive management** approaches that track and respond to environmental change and emerging threats.
- that scientific uncertainty shall not prevent taking **precautionary measures** as appropriate to protect coral reefs.
- to incorporate the **human dimension** into coral reef conservation strategies by ensuring that management measures reflect, and are sensitive to the local socio-economic, political and cultural environment, and that they build an informed public engaged in choosing alternatives to activities that harm coral reefs.
- to apply **marine zoning - including marine protected areas and no-take ecological reserves** - in order to protect and replenish coral reef ecosystems by minimizing harmful human impacts and user conflicts in important habitats.
- to fully and proactively use **existing management authorities and programs** at the federal, state and territorial levels, and develop, where needed, new legal mechanisms that protect, restore and enhance coral reef ecosystems.
- to develop and support strong **domestic partnerships** among governmental, private and scientific interests to meet the complex cross-jurisdictional challenges of coral reef conservation.
- to provide global leadership to **reduce global threats** to coral reefs through international technical and development assistance, capacity building and collaboration.

III. TAKING ACTION

A. UNDERSTAND CORAL REEF ECOSYSTEMS

Coral reefs are imperiled throughout the world. Threatened by a growing number of natural and anthropogenic stresses, including nutrient over-enrichment, sedimentation, over-fishing, climate change, bleaching, disease and habitat destruction, coral reef ecosystems are deteriorating worldwide at alarming rates. The origin and impacts of these threats range from very localized and potentially manageable events, such as resource extraction or coastal development, to poorly understood global phenomena affecting entire ocean basins (e.g., climate change, bleaching and disease). The challenge of interpreting, predicting and responding to such stressors on coral reefs is further exacerbated by the complexity and variability of reef ecosystems in space and time. Adjacent reefs on the same coastline may be inexplicably different, while a single reef may cycle through significant changes in composition and health in response to unknown events.

Ultimately, our success – or failure – in conserving these highly complex and extremely fragile ecosystems will depend on a parallel approach of proactive, precautionary management measures coupled with a much more sophisticated level of understanding about their fundamental ecology and response to environmental stressors. As this knowledge base evolves, it will provide invaluable support for management actions such as the siting of new marine protected areas or the development of more effective discharge standards. Unfortunately, the nation lacks a coordinated effort to determine the status of coral reefs, the causes of coral reef decline, or the impact of natural and anthropogenic stress on coral reef and associated ecosystems.

Toward that goal, the Coral Reef Task Force will actively pursue four major components of understanding coral reef ecosystems and their long-term conservation:

- develop comprehensive maps of all U.S. reefs
- develop a nationally coordinated coral reef inventory, assessment and monitoring program
- support strategic research focused on the determinants of coral reef health and recovery, including basic ecological processes, bleaching and disease, and best management practices for coral reefs and closely linked marine and terrestrial habitats.
- conduct socioeconomic studies of the human dimension of successful coral reef conservation.

1. Map All U.S. Coral Reefs

Rationale and Need. Accurate geo-referenced information on the exact location of specific natural resources and habitat types is essential for effective management of any marine habitat. This need is particularly acute for coral reefs where reef-dwelling communities may be very different over short distances and where the consequences of misinformed management decisions, such as the siting of potentially harmful human activities, can have devastating and lasting ecological consequences.

Comprehensive maps and habitat assessments form the foundation for a variety of reef conservation measures, including:

- creating accurate baselines for long-term monitoring.
- illustrating important community-scale trends in coral reef health over time.
- characterizing habitats for place-based conservation measures such as MPAs.
- enabling scientific understanding of the large-scale oceanographic and ecological processes affecting reef health.

Clearly, a set of recent, accurate and carefully designed mapping products can greatly enhance coral reef conservation and management efforts throughout the US.

Unfortunately, most coral reefs in U.S. waters, and particularly those in the Pacific Ocean, have not been accurately mapped with modern techniques and at a scale relevant to emerging conservation issues.

To address this critical information need, the Mapping and Information Synthesis Working Group: (i) evaluated the status of existing mapping products for U.S. reefs; (ii) surveyed local mapping and assessment needs among the U.S. islands of the Caribbean and Pacific; (iii) prioritized mapping activities within regions; (iv) identified strategies to fill gaps in technology and data access necessary to enhance mapping capabilities for coral reefs; and, (v) developed a detailed Mapping Implementation Plan that describes these activities and their outcomes.

Plan of Action. From that consensus-based process, the CRTF is committed to produce comprehensive digital maps of all coral reefs in the U.S. States and Trust Territories within 5 to 7 years. During this period, the ongoing mapping of the Caribbean region will be completed, and new efforts will begin in the Pacific where critical data gaps presently exist. This interagency effort will produce maps at both low- and high-resolutions that address locally identified conservation and management needs. All mapping products will be: (a) made publicly available to federal, state, territorial and local agencies, as well as the general public; (b) designed with local input to ensure that the location of sensitive natural and/or cultural resource features are not unduly compromised; and, (c) developed consistent with national security requirements.

Overall, the mapping project comprises three primary elements:

Key Conservation Objectives – Synthesizing Specific Action Items in Table A.1

- Develop **high-resolution benthic maps** and coastline surveys of local and regional coral reef ecosystems using satellites, aircraft and *in situ* surveys, with particular emphasis on marine protected areas, reefs at risk of degradation due to human activities, and other priority sites identified by the U.S. Islands representatives.
- Develop **large-scale, low-resolution maps** of broad coral reef ecosystems throughout U.S. waters using satellites and other remote sensing assets for use in characterizing habitats, designing monitoring programs, and planning regional conservation measures such as marine protected areas.
- Develop and adapt **new technologies and data sources** to enhance coral reef mapping, survey and assessment capabilities to detect important ecological changes and trends.

2. Monitor, Assess and Inventory Reef Health

Rationale and Need. Successful coral reef conservation requires adaptive management that responds quickly to changing environmental conditions. This, in turn, depends upon monitoring programs that track trends in coral reef health and reveal significant trends in their condition – before irreparable harm occurs. Monitoring can also play a vital role in guiding and supporting the establishment of complex or potentially controversial management strategies such as no-take ecological reserves, fishing gear restrictions or habitat restoration, by documenting the impacts of gaps in existing management schemes and illustrating the effectiveness of new measures over time.

When linked to comprehensive habitat mapping efforts, a rigorous monitoring and assessment program will contribute to coral reef conservation by:

- documenting the status of ecologically and economically important reef species
- tracking and assessing changes in reef communities in response to environmental stressors or specific human activities and uses
- evaluating the effectiveness of specific management strategies and identifying directions for future adaptive responses
- evaluating the natural recovery and/or restoration of injured or degraded reefs
- enabling informed decisions about the location of potentially harmful activities
- providing baselines for assessing catastrophic damage from natural or manmade events such as storms, diseases, vessel groundings, and toxic spills
- serving as an "early warning system" for identifying declines in coral reef health

In spite of the fundamental importance of this type of time-series information, there is currently no nationally coordinated monitoring effort for coral reefs in U.S. waters. Although a number of monitoring programs are currently operated by various governmental and private entities at local, state and regional levels, they generally lack a consistent design, comparable data sets and products, or easy interoperable access by users.

Plan of Action. Recognizing this long-standing and fundamentally important management need, the Coral Reef Task Force places high priority on the establishment of a nationally coordinated, long-term monitoring program for U.S. coral reefs. The program will link new efforts to ongoing successful monitoring programs worldwide. Preliminary CRTF efforts will focus mainly on reef habitats of particularly high value (e.g., existing or planned marine protected areas) and on reefs at high risk of degradation from human activities. Subsequent stages will expand monitoring coverage to wider areas containing coral reef habitats throughout U.S. waters.

The primary elements of the CRTF Monitoring Strategy are the following:

Key Conservation Objectives – Synthesizing Specific Action Items in Table A.2

- Working closely with partners and stakeholders, develop and implement a nationally coordinated, long-term program to inventory, assess and monitor U.S. coral reef ecosystems.
- Develop a web-enabled data management and information system for U.S. reef monitoring and mapping data, with user-friendly GIS-based mapping and querying capability to present complex information in usable formats to all potential users, while ensuring the security of sensitive place-based biological or cultural resource data.
- Prepare biennial reports on the *State of American Coral Reef Ecosystems*.

3. Conduct Strategic Research

Rationale and Need. We are now witnessing a steady stream of alerts about entire reef tracts being devastated by bleaching events, disease outbreaks, chronic over-harvesting and other stressors. Unfortunately, modern coral reef ecology is still a comparatively young discipline, and many of these phenomena remain only partially understood, particularly as they relate to coral reef conservation. For example, the causes and impacts of many coral reef stressors remain uncertain, as do many of the fundamental ecological processes that determine the structure, condition and dynamics of healthy coral reef communities and the recovery of impaired systems.

As a result, the coral reef conservation community is at a great disadvantage in understanding and predicting both local and ecosystem scale responses to the varied and complex pressures facing reefs today. In essence, the threats to coral reefs are increasing faster than the scientific knowledge base needed to understand and eliminate them through active conservation measures. Without significant effort to *strategically target research* on coral reef conservation issues, this race may be lost within our lifetimes. At present, the intensity of coral reef research - both basic and applied - is insufficient to meet these needs. Moreover, further efforts are needed to identify and target critical knowledge gaps through cooperative assessment and planning by federal and state resource and funding agencies with responsibilities for coral reef ecosystems.

Plan of Action. To meet the need for research on key threats facing U.S. coral reefs, two main activities are proposed: (1) a long-term, holistic program of ecological studies of coral reefs to improve our understanding of the underlying processes that govern the health of coral reef ecosystems in the Caribbean/Atlantic and Pacific regions, and (2) formation of a Coral Disease Consortium to organize and coordinate the scientific resources of the U.S. and its territories to address increasingly urgent ecosystem-scale threats such as disease, bleaching, and other sources of mass mortalities.

1. Long-Term Regional Research Program. Gaining a better understanding of the complex connections and interactions of coral reef ecosystems is critical to predicting coral reef response to natural and anthropogenic stresses and to assess alternative management strategies to promote their survival and recovery. Long-term, holistic ecological studies are needed to acquire basic information on the underlying factors that regulate coral reef ecosystems and on the key threats that are causing their decline. The National Science Foundation (NFS) supports much of the fundamental research that contributes to advancing current understanding of coral reef ecosystems. Building on this base, NOAA and the U.S. Department of the Interior (DOI) propose to co-sponsor, along with other potential agency partners, a long-term (minimum of five-years), ecosystem-level research program on coral reefs in the Pacific and Atlantic oceans. This research initiative will support management-oriented basic research to develop a better understanding of the impacts of land-based activities and extractive pressures on the health of coral reef ecosystems in the Pacific and Caribbean. The program will be implemented through a competitive, peer-review process to ensure the highest quality science. Products will include research data, assessments, synthesis reports and technical guidance that will provide resource managers, resource users, and the public with timely information and new insights about important reef conservation issues, as well as predictive tools such as simulation models that will assist managers in making scientifically informed decisions.

The objectives of this management-driven regional research strategy are to: (1) understand the ecological and oceanographic processes responsible for structuring reef communities and for influencing their health, degradation and recovery, (2) understand and predict the response of reef communities to anthropogenic environmental stressors, including land-based pollution and consumptive uses, (3) Demonstrate the ecological linkages among different coral reef habitats - including where appropriate mangroves and

seagrass beds - on local, regional and international scales; and, (4) design, evaluate and adapt specific reef management strategies to reduce human impacts.

2. *Coral Disease Consortium*. Coral diseases, bleaching, and mortalities are increasing worldwide in frequency, distribution and range of taxa affected. While new disease syndromes caused by biotic and abiotic stressors are emerging with alarming frequency, most have not been thoroughly characterized and their etiologies and causative agents remain uncertain. Although natural disease-causing organisms and anthropogenic stressors, acting alone or in combination, are believed to cause many of the diseases and mortalities observed among corals, the cause-effects relationships are largely unknown.

To fill this gap in our understanding of these rapidly emerging threats to reefs worldwide, the CRTF will establish a Coral Disease Consortium focused specifically on coral health issues, with an emphasis on the diagnosis and etiology of coral diseases and bleaching. This unique interagency *virtual center* will draw on the expertise of scientists from around the U.S. who are actively involved in bleaching and disease research; provide a coordinated focal point for researching and tracking the progression of bleaching and disease events; and help identify environmental influences that affect these phenomena. The Consortium will be implemented through interagency partnerships of EPA, NOAA, and DOI. Contingent on availability of funding, the activities of the Consortium will be initiated at existing laboratories of the participating agencies in addition to funding targeted research on coral reef bleaching and disease issues.

The Coral Disease Consortium will organize and coordinate the scientific resources of the U.S. and its territories in order to:

- document the condition of our coral reef ecosystems
- determine the occurrence, causes and effects of diseases and bleaching
- define exposure-response threshold values and associated criteria, as appropriate
- provide technical information and assistance to managers and scientists regarding the health of coral reefs and possible causes and remedies.

The primary elements of the Coral Reef Task Force's strategy to improve understanding of critical coral reef issues and processes include the following:

Key Conservation Objectives – Synthesizing Specific Action Items in Table A.3

- Design and implement a regionally-focused competitive research program on the natural processes that regulate coral reef ecosystem health and on the causes, impacts and potential remedies for important anthropogenic threats
- Create an interagency *Coral Reef Disease Consortium* to study, evaluate, track and predict outbreaks of coral diseases and bleaching worldwide.
- Study the impact of management actions on local communities with a view to promote their sustainable development.

4. Understand The Human Dimension

Rationale and Need. Most coral reefs occur in shallow water near shore. As a result, they are particularly vulnerable to the effects of human activities, both through direct exploitation of reef resources, and through the indirect impacts of adjacent land-based activities such as polluted runoff from coastal development. Many of these activities, and thus their eventual impacts on reefs, are inextricably woven into the social, cultural, and economic fabric of regional coastal communities. Consequently, any meaningful reductions in human impacts on reefs will necessarily require a much greater understanding of, and management attention to, the underlying motivations and beliefs that influence our commitment to conserving healthy coral reef ecosystems. Although this *human dimension* is often overlooked in developing coral reef management strategies, it is crucial for their long-term success. This is particularly important among many of the U.S. Islands, in which traditional uses of coral reef resources, including subsistence fishing, have been an integral part of locally managed sustainable use for generations.

Plan of Action. In recognition of the fundamental importance of the human dimension to successful coral reef conservation, the Coral Reef Task Force will actively seek to incorporate the social, economic and cultural dimensions of its broader conservation strategies through the following steps:

Key Conservation Objectives – Synthesizing Specific Action Items in Table A.4

- Develop regional economic valuations of coral reef ecosystems – including both market and non-market values – to help strengthen management approaches and ensure effective decision-making.
- Conduct locally focused socio-economic studies of high-risk anthropogenic threats in specific U.S. coral reef habitats in order to resolve important user conflicts affecting these and other coral reefs.
- Evaluate examples of traditional and community-based coral reef conservation efforts on coral reefs, particularly in the U.S. Islands, support sustainable practices, and transfer the lessons learned to other management programs.

B. REDUCE THE ADVERSE IMPACTS OF HUMAN ACTIVITIES

The most severe threats to coral reefs stem directly from human activities. Human impacts on reefs range from direct exploitation of specific natural resources (e.g., fishing, coral and live rock extraction, and sand mining), to more diffuse degradation of large reef tracts caused by runoff of sediment or polluted waters from urban areas, mangrove deforestation, coastal development or other upland activities. These impacts are exacerbated by degradation of the overall marine environment due to global climate change.

While the nature and magnitude of human impacts vary tremendously among reefs, in the United States many of the underlying activities are authorized and regulated under law and therefore can be managed or mitigated using existing federal and state authorities and programs tailored to local needs. In addition, human impacts stemming from lands under private ownership can be minimized through voluntary implementation of various model conservation measures. On a broader scale, consumer and life style choices made every day by Americans and others around the world contribute to global warming, pollution, overexploitation and other stresses on coral reefs worldwide.

To a very real extent, the future of U.S. coral reefs lies in our hands, and specifically in our technical capacity and our national will to reduce or eliminate avoidable human impacts, both domestically and internationally. To that end, the U.S. Coral Reef Task Force will actively pursue a comprehensive program of 9 critical conservation strategies designed to reduce or eliminate the most significant and tractable threats to coral reefs:

- expand and strengthen the U.S. network of coral reef marine protected areas
- reduce impacts of extractive uses
- reduce habitat destruction
- reduce pollution
- restore damaged reefs
- reduce global threats to coral reefs
- reduce impacts of international trade in coral reef resources
- improve interagency accountability and coordination
- create an informed public

1. Expand and Strengthen the Network Of Coral Reef Marine Protected Areas

Rationale and Need. If current declines in coral reef health continue, these vital coastal ecosystems may be severely damaged or lost within our lifetimes. Many of the chief threats to coral reefs stem from human activities taking place on or near specific reef tracts. If we are to reverse this trend in coral reef health, the stewards for the nation's coral reefs must act quickly and decisively using every practical conservation tool available. Among the most promising of these are marine protected areas (MPAs) that encompass and protect important habitats where harmful activities can be minimized, eliminated or allocated to appropriate areas and/or seasons through a system of marine zoning.

MPA Types and Benefits. For the purposes of this Action Plan, the term *marine protected area* is understood as any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment. In practice, this broad and widely used definition encompasses a spectrum of place-based management approaches varying in size, purpose and level of protection afforded reefs within their boundaries. Examples range from no-take reserves where resource extraction is prohibited in order to protect biodiversity and/or to enhance specific fisheries stocks, to multiple use sites that balance sustainable human uses with resource conservation goals within their borders through a system of special use zones designed for specific reef areas and/or seasons.

MPAs have proven to be an effective and equitable conservation tool for coral reefs throughout the world. Effective MPAs protect the biodiversity and ecological integrity of the resources and habitats they encompass. They can also serve an integral role in an overall ecosystem approach to coral reef management and conservation. As such, they may represent the nation's best – and perhaps last – hope to save these invaluable coastal ecosystems from further decline.

Among the various types of MPAs, ecological reserves – or no-take zones – are particularly effective in maintaining biodiversity, productivity and ecological integrity on coral reefs and other marine habitats. Their protection of critical habitats from resource extraction and destruction provides a “safe haven” for the replenishment of harvested or imperiled species both within and beyond their boundaries. For example, many marine scientists have called for protection of over 20 percent of the total potential fishing area as no-take zones as a minimum to ensure population sustainability. A National Research Council report on sustainable marine fisheries recently recommended that this figure provides a worthwhile reference point when insufficient information is available to determine necessary no-take area size based on species life histories, use of habitat and community function.

Gaps in the National MPA System. Coral reefs under some form of MPA status are found in the Pacific, Atlantic, Caribbean and Gulf of Mexico. They are administered by a number of federal, state, territorial and local entities and include national marine sanctuaries, national parks and monuments, national fish and wildlife refuges, national estuarine research reserves, fishery reserves, marine conservation districts, and numerous non-federal parks and managed areas. Although all of the existing U.S. coral reef MPAs are intended to conserve these fragile habitats, they nevertheless vary widely in design, size, legal authority, management goals and measures, and level of protection afforded to the encompassed coral reefs. For example, while fishing is considered to be among the most destructive and pervasive threats to coral reefs in the United States and worldwide, relatively few existing MPAs address this activity directly.

A Global Representative System of Marine Protected Areas, World Conservation Union (IUCN), 1995.

Thus, although some U.S. coral reefs now have some form of enhanced protection through MPA status, there is widespread belief and concern among scientists, stakeholders and the management community that the current system of MPA sites does not provide adequate long-term protection against the growing number and severity of threats to coral reefs today. Key aspects of this problem include:

- *Gaps in Geographic Coverage.* Many of the nation's most important coral reefs are not currently adequately protected against rapidly emerging threats.
- *Gaps in Protection Within Existing Sites.* Many existing coral reef MPAs are managed using plans developed years or even decades ago, when uses of, and threats to, reef ecosystems were considerably different than they are now (e.g., fishing pressure).
- *Linkages among Sites.* Although some recent exceptions exist, federal and state resource agencies have generally not collaborated on the design of MPA sites or networks, or on their coordinated management. Consequently, the current MPA system does not provide for important ecological linkages among distant habitats (e.g., through migration corridors, larval pools, oceanographic transport, etc.).
- *Multiple U.S. Jurisdictions.* An additional complexity is created by the multiple jurisdictions and authorities under which marine protected areas may be designated and managed in the United States. These systems, including federal, state, territorial and local programs, often differ considerably in purpose, scope and authority.
- *International Cooperation.* Many U.S. coral reef MPAs are influenced by ecological processes and conditions in other countries, often over considerable distances. In addition, most reefs of the world lie outside U.S. waters but are also in need of enhanced protection. Significant opportunities exist for collaboration in multilateral planning and conservation of special coral reef habitats around ocean basins and within regions.
- *Confusion over Definitions and Goals.* The United States – and indeed the world – has suffered from the lack of consistently applied definitions to describe the various levels of protection and allowable uses in marine protected areas. This situation has led to considerable confusion, and potentially avoidable conflict, among resource agencies, scientists and stakeholder groups.

Plan of Action. Recognizing the urgent need to protect our most important reef habitats from further decline, the Coral Reef Task Force is committed to strengthen and expand the nation's existing coral reef marine protected areas. Beginning immediately we will undertake the design and implementation of a comprehensive national system of coral reef marine protected areas in U.S. waters, including significant new no-take ecological reserves to protect biodiversity and support sustainable fisheries on important reefs. While individual MPA sites within this system will undoubtedly vary in purpose, size,

level of protection and applicable management authority, all will contribute to the same overarching national conservation goal: *to ensure the long-term viability, ecological integrity and sustainable use of the nation's and the world's coral reefs for future generations.*

Central to the success of this critical national effort will be the meaningful and sustained public participation by several key stakeholder groups in all phases of the design, implementation and evaluation of this system. Chief among these are: (a) resource managers from governmental agencies with jurisdiction or expertise relevant to coral reef resources and habitats; (b) commercial and recreational users and stakeholders; (c) environmental groups; and (d) coral reef scientists and other subject matter experts. Moreover, the development of an integrated network of coral reef MPAs will necessarily take into account appropriate legislative and regulatory authorities at all levels of government, with particular emphasis on involving the Island states and territories in the evaluation, design, establishment and implementation of component sites. This issue is of particular importance in the Pacific Islands, where traditional, community-based and subsistence uses of nearshore coral reef habitats, including protected areas, are intimately linked to cultural values and practices.

This critical marine conservation endeavor consists of five parallel tracks to be undertaken immediately:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.1

- Accelerate ongoing efforts to strengthen protection of resources within *existing MPAs* of all types through the review and revision of applicable management plans, programs, policies and legal authorities.
- Establish *additional no-take ecological reserves* to provide needed protection to a balanced suite of representative U.S. coral reefs and associated habitats, with a goal to protect at least 5% of all coral reefs and associated habitat types in each major island group and Florida by 2002; at least 10% by 2005, and at least 20% by 2010. Toward this end, immediately move forward to establish no-take reserves in the highest priority reef habitats.
- Conduct a national assessment of the remaining gaps in protection throughout U.S. coral reef ecosystems and establish *new MPAs* – including multiple use sites - where additional protection is needed.
- Strengthen and support *international cooperation* among countries possessing coral reef habitats to conserve global biological diversity and to enhance the viability of reef systems world-wide, and particularly in regions where MPAs may serve as “sources” for the trans-boundary supply of planktonic larvae to seed U.S. and international reefs.

- Develop and provide *tools for MPA management*, such as models of community-based conservation, policy guidance and model legislation, and cutting-edge methods to evaluate management effectiveness or to determine functional linkages among distant MPA sites.

2. Reduce Impacts Of Extractive Uses

Rationale and Need. Coral reefs and associated habitats provide fishery resources that represent a critical source of food, both commercial and subsistence, and recreation for the U.S. and world populations. Many coastal populations in the United States have historically relied upon nearby coral reefs for food, construction materials and trade. In recent times, this formerly sustainable local collection has been overtaken by growing coastal populations, increasing domestic consumption and global trade of coral reef resources. In many cases, increased rates of collection, and associated habitat destruction, threaten to exceed the regenerative capacity of reefs that have traditionally sustained subsistence fishing for generations through community-based conservation measures. Overfishing has become the most widespread direct human impact on coral reefs.

Fishing Impacts. Overfishing of high value species has been documented on nearly all U.S. inshore reefs on populated islands, and is spreading to deeper reefs and more remote locations. For example, long-term catch trends suggest that there has been dramatic decline (~ 80%) in the nearshore Hawaiian fishery stocks in this century. The abundance of the top ten aquarium fish species has decreased by 59% in just two decades at one site on the Island of Hawai`i. In Florida and the U.S. Caribbean, overfishing of groupers has prompted the National Marine Fisheries Service to name four species as candidates for listing under the Endangered Species Act.

Of even greater concern are the dramatic changes that have been observed on reefs when herbivores are overharvested – often resulting in ecosystem shifts in which corals and other important reef-dwelling benthic invertebrates become smothered by overabundant fleshy algae. Also of concern are the habitat damage caused by inappropriate fishing methods and gear, the continued occurrence of destructive fishing methods, and the bycatch of non-target species. Other indirect impacts associated with fisheries include anchor damage, vessel groundings, and damage from fishing debris and poorly designed artificial reefs.

Mariculture or marine aquaculture (e.g., of corals, giant clams, or fishes) is growing rapidly in regions with coral reefs. It has the potential to provide employment and decrease collection pressure on wild populations. However if poorly sited or managed, mariculture in open systems can adversely affect coral reef ecosystems by disrupting submerged land on and adjacent to reefs, serving as fish aggregation devices, introducing invasive alien species, discharging nutrients, and causing disease.

Plan of Action. In order to protect coral reef ecosystems and ensure sustainable fisheries, the Coral Reef Task Force will undertake several integrated measures intended to eliminate excessive and unsustainable extraction of reef resources on U.S. reefs.

Key elements of this strategy include:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.2

- Identify, monitor and protect critically important U.S. coral reef fisheries habitats and spawning populations through an expanded network of no-take ecological reserves, following the targets, milestones and guidelines presented above in Section B.1.
- Reduce the impacts of fishing where it occurs by eliminating destructive fishing practices, reducing bycatch and overfishing, assessing current fishing regulations, assessing the need for additional gear restrictions as needed, providing enhanced enforcement and education, and removing fishing debris from reefs off the U.S. Pacific Islands.
- Assess deeper coral reefs, banks and beds, and develop a strategy to conserve these critical ecosystems.
- Reduce the overexploitation of reef organisms for the aquarium trade by: (a) restricting domestic collection of coral and live rock, (b) monitoring the collection of other species, (c) developing new management measures or ecologically sound alternatives to wild collection (see also Section B.7), (d) evaluating the effectiveness of existing legal authorities and policies governing the collection and importation of coral and other reef-dwelling species, and (e) taking appropriate action to ensure that international trade in coral reef species for use in U.S. aquariums does not threaten the sustainability of coral reef species and ecosystems.
- Work with State and Territory resource management agencies, Fisheries Management Councils and other interested entities to explore more effective ways to incorporate ecosystem-scale considerations into Fishery Management Plans for coral reef areas.
- Develop a process to evaluate issues and possibly develop guidance related to coral reef aquaculture in conjunction with relevant interagency groups including the Aquatic Nuisance Species Task Force and the Invasive Species Council.

3. Reduce Habitat Destruction

Rationale and Need. Coral reefs require thousands of years to develop, but can take only minutes to destroy. Reefs around the world, including in the United States, are being damaged regularly, and in some cases irreparably, by a number of potentially avoidable human activities, including poorly planned coastal development and shoreline modification, and direct impacts by vessels, anchors and other activities. To some extent, these growing pressures are symptoms of the rapid growth in coastal populations and tourism over the past few decades, and of current resource limitations in programs responsible for implementation and enforcement of existing conservation authorities.

Coastal Activities. Many reefs, especially those nearshore, have suffered from the direct or indirect impacts of deliberate alterations to offshore habitats or to the adjacent shoreline and upland areas. These include dredging for navigation or marinas, breakwaters and other hardened shoreline protection measures, beach renourishment, sand mining, installations of pipelines and underwater cables, and land-use practices, including road construction. To the extent that these activities are undertaken or permitted by federal and state agencies, several preventative measures can be taken immediately at relatively low cost and within existing authorities. In addition, the vast increases in coastal tourism have resulted in increased pressure on coral reef resources, either through direct impacts on the reefs or indirectly through increased levels of coastal development, sewage discharge, vessel traffic, etc.

Vessel Impacts. As the number of people using and transiting coral reefs increases annually, so too has the frequency of vessel groundings on reefs. Every year hundreds of vessels strike U.S. coral reefs, causing significant damage that goes largely unrepaired and unrecovered. In the Florida Keys National Marine Sanctuary alone, approximately 500 small vessel groundings occur each year. Vessels striking shallow coral reefs can cause profound damage to the habitat by destroying the benthic community, displacing resident fishes, and eliminating critically important topographic complexity and habitat structure that is the result of thousands of years of growth. In addition, propeller scarring, anchoring and other physical impacts are of growing concern in nearshore habitats, especially close to large population centers, or off-shore at way-points for shipping traffic. In certain cases, the impacted reefs cannot recover without direct, and often expensive, human intervention in the form of immediate clean up of debris, emergency triage of injured animals, and long-term restoration of habitats and benthic communities.

Military Activities. While it is recognized that military activities potentially can have adverse impacts on coral reefs, the Department of Defense (DoD) is addressing these concerns by implementing coral reef protection efforts that focus on effective and long-term conservation. Recognizing that coral reef ecosystems are biologically rich and diverse habitats, DoD gives high priority to their protection and, to that end, is developing management guidelines and policies to enhance coral reef protection. For example, every military installation whose operations may affect a coral reef ecosystem must prescribe and include protective measures in the installation's Integrated Natural

Resources Management Plan. DoD is also an active participant in the implementation of the Coral Reef Protection Executive Order, 13089. DoD policy issued under the E.O. establishes that it is DoD practice to protect U.S. and international coral reefs and to avoid impacting coral reefs to the maximum extent feasible consistent with mission requirements.

Plan of Action. Many of the adverse habitat impacts of coastal development and vessel groundings can be prevented through consistent and proactive application of existing federal and state authorities and programs, and through a rapid and scientifically informed response to the injury. Toward that end, the CRTF Working Groups have developed specific actions to significantly reduce these severe threats to coral reefs.

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.3

- Strengthen, improve and better integrate federal and state permitting and management programs for *coastal development activities* that impact coral reef habitats by developing long-needed technical guidance, impact thresholds and policy directives designed to minimize or avoid adverse impacts to reefs.
- Initiate actions at the national and international levels to prevent vessel groundings and other *vessel-related impacts* by improving seamanship, strengthening aids to navigation, enhancing vessel traffic management measures; installing and maintaining mooring buoys in areas where anchor damage is likely, enhancing local and regional emergency response capabilities, strengthening and standardizing enforcement and damage assessment actions, and, where needed, developing additional legal authorities.
- Develop informal guidance, protocols and technical assistance programs to reduce the risks of damage to coral reefs resulting from activities conducted, funded or approved by *federal agencies*.

4. Reduce Pollution

Rationale and Need. Healthy coral reefs require good water quality and natural habitats. Pollution enters reef ecosystems in many ways ranging from specific point source discharges such as sewage pipes and vessels, to more diffuse runoff from land-based sources such as agriculture, coastal development, road construction or golf course irrigation. Water pollution can poison sensitive species, disrupt critical ecological functions, and trophic structure and dynamics, and impede the normal settlement and growth of critically needed reef-dwelling larvae.

Conserving the nation’s coral reefs will require reductions in the amounts, sources and cumulative impacts of five types of pollution:

- *Sediment.* Excess sedimentation generated by coastal development, agriculture, and offshore dredging is smothering living coral reefs worldwide. High sedimentation can kill existing benthic communities and retard their recovery by inhibiting future recruitment.
- *Nutrients.* Increased nutrients from agriculture, fertilizers, sewage discharge and aerial atmospheric deposition can disrupt the normal trophic structure and dynamics of coral reefs by artificially encouraging algal blooms.
- *Oil and Chemicals.* Numerous chemicals enter coral reef habitats through point and nonpoint sources including land-based runoff, industrial effluents, vessel discharges and oil and chemical spills. Their effects can disrupt normal biological and ecological processes, and retard coral reef community growth and recovery.
- *Marine Debris.* Many reefs, particularly those in the Pacific, are cloaked by large amounts of man-made debris lost by commercial fishing operations or emanating from other marine or terrestrial sources. These objects degrade reef health by abrading, smothering and dislodging corals and other benthic organisms, preventing recruitment on reef surfaces, and continued entanglement of fish, marine mammals, crustaceans and other mobile species.
- *Invasive Alien Species.* Like all marine habitats, coral reefs are increasingly vulnerable to invasion by alien species that can cause lasting ecological and economic harm. The primary pathways of introduction into coral reefs include ships' ballast water, releases and escapes from aquaria, aquaculture and research operations, and fouling organisms on movable marine equipment such as floating dry docks or ship hulls or marine debris.

Plan of Action. Although the sources, characteristics and impacts of pollution vary widely among U.S. reefs, many could be significantly reduced or potentially eliminated by fully implementing existing authorities among various federal and state agencies. The following actions are designed to meet that important goal:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.4

- Strengthen the scientific rigor and ecological relevance of existing water quality programs and permitting mechanisms that routinely affect coral reefs.
- Develop innovative partnerships with, and provide technical guidance to, landowners, federal, state and local governments, and users to reduce land-based sources of pollution on a watershed scale, and where appropriate, on a river basin scale.
- Control discharges from known point sources including onshore facilities and offshore sewage and industrial pipes, and vessel operations.

- Evaluate and address the potential impacts of aerial atmospheric deposition of nutrients and other pollutants, where they are potentially significant sources of pollution loading.
- Prevent, prepare for, and respond to oil and chemical spills to reduce impacts on reef ecosystems.
- Clean up existing concentrations of marine debris and address known sources in the future.
- Evaluate and mitigate major pathways of invasion by alien species.

5. Restore Injured and Degraded Habitats

Rationale and Need. A well-developed coral reef can represent thousands of years of slow incremental growth by resident stony corals, and consequently, many corals living today are centuries old. However, in spite of the longevity and apparent natural resilience of corals and the reefs they construct, both are extremely vulnerable to destruction by human activities – either gradually through degraded habitat quality, or suddenly through catastrophic damage from vessel groundings, toxic spills or habitat destruction.

In many circumstances, damaged coral reef communities recover very slowly – if at all – particularly when the underlying habitat structure is destroyed, or when the prevailing environmental conditions have been chronically degraded over time. In such cases, full recovery of pre-existing ecological communities, and the full range of services they provide, may require hundreds or thousands of years without active intervention by resource managers. Such measures may range from eliminating anthropogenic stressors that impede recovery, to more direct restoration of damaged habitats or depleted populations.

Coral reef restoration is a young science, and the majority of our collective experience derives from attempts to repair vessel-grounding sites by recreating physical reef habitat and transplanting adult corals in damaged areas. Recent scientific studies of ways to enhance recovery rates show promise for future restoration efforts.

Thus, while it is clearly preferable to *prevent* the loss of coral reef habitat through the kinds of proactive conservation measures presented elsewhere in this Action Plan, reality requires that the stewards of these slow growing biogenic habitats also be prepared to actively *restore* reefs that are injured or degraded. To that end, the Coral Reef Task Force will pursue several avenues to strengthen restoration science and methods in the United States and abroad.

It should be noted, however, that Executive Order 13089 prohibits federal agencies from actively harming coral reefs, with limited exceptions such as in time of war, or when necessary for reasons of national security. Consequently, the Coral Reef Task Force does not normally view restoration as a legitimate means to mitigate actions or projects that are expected to adversely impact reef habitats, other than those deemed necessary for national security reasons.

Plan of Action. Recognizing the need to be able to restore injured or degraded coral reefs under certain circumstances, the CRTF recommends that Federal, State, and local agencies pool their resources and expertise to strengthen the efficiency and effectiveness of restoration. These actions, which involve research, monitoring, pilot studies and technology transfer, include:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.5

- Review and evaluate existing reef restoration projects to quantify the extent that they expedite recovery, and make recommendations for improvements.
- Develop and test innovative methods and techniques to expedite reef restoration for all major categories of coral reef injury.
- Develop regional restoration plans that identify significant restoration alternatives, and weigh the costs and benefits of natural recovery.
- Based on the review of restoration approaches, promote cost-effective pilot restoration of selected degraded U.S. reefs, focusing on habitats of high ecological, economic, social or conservation value.
- Transfer proven restoration tools, techniques and lessons learned to domestic and international partners.

6. Reduce Global Threats to Coral Reefs

Coral reefs around the world are seriously threatened by direct and indirect human actions. The 1998 *Reefs at Risk* study found that almost 60% of the world's coral reefs are potentially threatened by human activity, including coastal development, destructive

and over-fishing practices, overexploitation of resources, marine pollution and runoff from inland deforestation and farming. Reef Check surveys conducted in 1997 and 1998 found that most reefs are severely over-fished, with most organisms of high commercial-value missing from reefs. Over the last two decades, coral reefs have experienced an unprecedented loss of live coral cover due to human-caused and natural threats.

Increased Population Pressures: Six billion people now inhabit our planet, twice as many as 40 years ago, and an additional 3 billion is expected in the next 40 years. Population pressures are particularly acute in coastal areas. Presently, almost half a billion people are estimated to live within 100 kilometers of a coral reef, deriving great benefits from reef resources while placing increasing demands on these complex and fragile ecosystems that can no longer be sustainably met. Increasing coastal populations increase the threats from unsound coastal development, over-fishing for subsistence and commercial uses, marine pollution, and land-based sources of pollution and sediment.

Loss of mangrove forests: The ecological integrity of coral reefs is also severely threatened by the worldwide loss of coastal mangrove forests. Mangrove forests cleanse coastal waters by serving as buffer zones that absorb excess nutrients from agricultural runoff and human-derived wastes, and by retaining land-based sediments and pollution. In addition, mangroves serve a critical role in protecting the shore from storm surge and rising sea level, and are the nursery grounds and home to many commercially and ecologically important fish and other species.

Globally, human activities have already destroyed one-half of the original coastal mangrove forests. Deforestation has primarily occurred for conversion of land to agriculture, mariculture pond construction, firewood and charcoal production, building material, and coastal development. Over the last 10-15 years, an increasing international demand for shrimp has accelerated the conversion of mangrove forests to shrimp ponds; in some areas of the world, shrimp farming may account for almost all the loss of these precious forests.

Coral bleaching and mortality: Recent global impacts of catastrophic events, such as widespread coral bleaching and mortality and increased storm intensity, compound the more localized human impacts that place reefs at risk. Coral reef bleaching events have occurred worldwide at an increasing frequency since 1983. Widespread bleaching events are thought to be a consequence of steadily rising water temperatures driven by anthropogenic global warming in combination with El Niño. In 1998, coral reefs around the world experienced the most extensive and severe bleaching event in modern record; in many locations, 70 to 90% of all corals bleached and subsequently died.

Coral diseases and mortality: The unprecedented, sudden emergence of coral diseases in the western Atlantic is threatening the health of many corals and reefs, and thus the economic base for most of the Wider Caribbean. Adverse water conditions associated with increased sedimentation, eutrophication and pollutants may exacerbate the occurrence of the pathogens, coral diseases and coral mortality.

Destructive fishing practices and unsustainable use: The globalization of markets and the surge in international trade are also increasing the risks on reefs. Many coral reef and mangrove species and resources are collected around the world for commercial purposes such as food fish, the aquarium trade, live fish markets, construction materials, pharmaceuticals and traditional medicines. Some of this commercial collection involves destructive fishing practices, and, in many cases, the local and regional intensity of collection appears to be unsustainable over time.

Plan of Action. The United States is committed to collaborating with our domestic and international partners to protect and conserve international coral reefs and associated ecosystems. To accomplish this goal, the U.S. government will continue to exercise global leadership in shaping priorities and approaches that conserve coral reef, mangrove forest and seagrass ecosystems and global biodiversity, while sustaining the human communities that depend on them. Development and technical assistance efforts will focus on building human and institutional capacity for integrated coastal management, marine park and protected area management, sustainable tourism, and sustainable fisheries in coral reef nations; in many cases, these capacity-building efforts will provide the foundation for a governance system based upon the principles of open, participatory democracy.

In response to the unprecedented worldwide coral bleaching and mortality, the U.S. Coral Reef Task Force passed a resolution in March of 1999 stating that biodiversity conservation can no longer be achieved without consideration of the global climate system and urging agencies to address the impacts of global climate change on the natural resources they manage. The United States will also continue to lead in scientific efforts that improve and increase information on the causes, occurrence and impact of bleaching and disease throughout the world; these efforts will be enhanced through the creation of the coral disease consortium.

Key elements of the proposed international conservation strategy are:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.6

- Exercise global leadership in the international arena in shaping and developing environmentally sound and comprehensive coral reef policy, strengthen international conventions and foster strategic partnerships with other countries, international organizations and institutions, the public and private sectors, and non-governmental organizations to address international threats to coral reef ecosystems.
- Strengthen the International Coral Reef Initiative and implement its Renewed Call to Action, and support the Global Coral Reef Monitoring Network and its linkage to the national monitoring effort.

- Provide assistance in managing and conserving reef ecosystems and their watersheds in the Wider Caribbean, the Pacific, South East Asia, East Africa, and Middle East regions; and support the creation and management of coral reef marine protected areas, particularly those that contain substantial ecological (*i.e.*, no-take) reserves
- Strengthen international research, monitoring and assessment efforts aimed at understanding, predicting, preventing and responding effectively to the impacts of large-scale phenomena such as bleaching and disease, and their socio-economic impacts
- Analyze and address unsustainable and destructive fishing practices and unsustainable international trade in coral reef and mangrove species. (Also see International Trade section.)

7. Reduce Impacts Of International Trade In Coral Reef Resources

Rationale and Need. Many coral reef species and resources are harvested globally for commercial purposes, including food, the aquarium trade, live fish markets, construction materials, curios, jewelry, pharmaceuticals and traditional medicines. Some of this commercial collection involves destructive fishing practices, such as the use of poisons to capture live reef fish for aquaria and live fish markets. In many cases, the local and regional intensity of collection appears to be occurring at unsustainable levels. The international trade in coral reef species is increasing at a rate of 10-20% per year.

The Executive Order charged the CRTF with analyzing and addressing the U.S. role in the international trade of coral reef species. The United States is the number one importer of live coral and marine fishes for the aquarium trade, and the largest importer of coral skeletons and precious corals for curios and jewelry world-wide. During the 1990's, the United States was consistently the world's largest importer of live coral, importing over 80% of the live coral and 95% of the live "rock" or reef base in international trade. Hundreds of thousands of kilograms of hard corals and live rock, and over 1000 different coral reef species, are estimated to be collected for trade every year. Ironically, the U.S. prohibits or strictly limits the extraction of stony corals in most of its federal, state and territorial waters. Coral reef fishes are also collected for the aquarium trade in U.S. waters, however cyanide is not used.

In addition, it is estimated that the United States imports nearly half of the total worldwide-trade in aquarium fishes, with approximately two-thirds originating in the Indo-Pacific. Between 15 to 20 million coral reef fishes are traded each year. Reports estimate that many of these are caught using cyanide.

Handling and care of coral reef species in trade is also a growing concern. A 1997 survey of U.S. retailers found that as many as one-third to over one-half of the aquarium fishes imported from Southeast Asia die shortly after arrival. Improvements in transportation, handling and husbandry of live coral reef species for the marine aquarium trade may also be needed to reduce mortality rates.

Plan of Action. As a major consumer and importer of coral reef organisms, a major player in the world trade arena, and a leader in coral reef conservation efforts, the United States has a critical responsibility to address the degradation and loss of coral reef ecosystems that may arise from commerce in coral reefs species and products. Following are some high priority actions intended to stem the adverse impacts of trade in coral and coral reef resources:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.7)

Continue to actively participate in international and regional fora, including CITES, APEC and ICRI, to address concerns relating to coral reef species trade and to raise global and regional awareness of this problem and its solutions.

- Continue consultations with coral exporting countries and other stakeholders to assess the nature and extent of the problems associated with the trade in coral reef species, to express U.S. government concern about the coral reef species trade problem and discuss possible approaches to mitigate the negative impacts of the trade.
- Expand capacity-building efforts in countries with coral reefs to enforce relevant laws and regulations, collect trade data, assess the status of reefs, evaluate the impacts of extraction of reef resources, develop and implement sustainable management plans, consider developing certification schemes and institute alternative and environmentally sound collection practices and alternatives, such as aquaculture and coral farming.
- Improve domestic law enforcement of illegal coral reef species trade.
- Work with various stakeholders to develop public education and awareness materials aimed at reducing unsustainable harvest practices.
- Work with the marine aquarium industry and various stakeholders to eliminate destructive collection practices and reduce mortality during handling and transportation of coral reef species.
- Provide additional measures as appropriate to ensure that U.S. consumer demand for marine aquarium organisms does not threaten the sustainability of coral reef species and ecosystems. (See also section B7)

8. Improve Governmental Coordination and Accountability

Rationale and Need. Executive Order (E.O.) 13089 on Coral Reefs directs U.S. government agencies to avoid actions and decisions that may harm coral reefs. Specifically, federal agencies are required “to the extent permitted by law, to ensure that actions they authorize, fund or carry out will not degrade the conditions of such ecosystems.” This Presidential directive is particularly important given that many potentially harmful activities (e.g., dredging, pollution discharge, fishing) are expressly authorized, permitted or conducted by federal agencies under existing authorities and programs. In addition, the E.O. specifies a number of other responsibilities involving coordinated planning and review of actions affecting coral reefs. At present, however, there exists no infrastructure to facilitate the implementation of Executive Order 13089 by federal agencies or their state and territorial conservation partners.

Plan of Action. To ensure that the conservation goals of E.O. 13089 are realized, the Coral Reef Task Force will establish a small, interagency staff responsible for the administrative aspects of coordinating the shared federal agency tasks of the Executive Order. Key elements of this interagency staff’s role include:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.8

- Coordinate the submission of Coral Reef Protection Implementation Plans by CRTF member agencies
- Coordinate joint planning and development of crosscutting budget initiatives on coral reef conservation.
- Coordinate the annual submission of agency reports of programs, policies and actions.
- Coordinate the process for the public inquiry about, and agency response to, issues or concerns relating to federal agency actions and coral reef protection.
- Working with the Council on Environmental Quality, assist member agencies and other interested entities, when requested by the agency, to develop guidance for the inclusion of coral reef protection in environmental documents prepared under the National Environmental Policy Act (NEPA) and Executive Order 12114.
- Develop and implement a comprehensive outreach and education strategy for the CRTF.
- Implement specific actions at the regional, state, territorial and local levels to strengthen the cohesive national strategy for coral reef conservation.

9. Create An Informed Public

Rationale and Need. Reducing human impacts to coral reefs often requires changing our collective behavior, beliefs, values and decision making-criteria about when, how and whether to conserve these vital ecosystems. Fundamental to the success of all of the Task Force Working Group’s conservation strategies is an informed and engaged public, including policy makers, industry representatives, non-governmental organizations and the myriad of other stakeholders that, either directly or indirectly, affect coral reefs. Numerous organizations have already done a great deal of innovative work to educate different constituencies about the importance of coral reef ecosystems and the need for specific management actions. We must build upon these efforts, working with others to increase awareness of coral reef conservation issues and inform specific target audiences about how they can help protect coral reefs.

Plan of Action. Toward that end, the Coral Reef Task Force will conduct a focused, multi-level outreach campaign designed to prevent further declines in coral reef health. The campaign will build upon and coordinate current outreach efforts to:

- raise general awareness, understanding, and appreciation of coral reef ecosystems;
- inform decision-makers and the general public about accomplishments and recommendations of the USCRTF;
- create and distribute solution-focused outreach materials targeting specific domestic and international threats and user-groups;
- promote local and regional outreach efforts designed to raise awareness about the importance of local coral reef resources and modify behaviors that affect reefs on a local scale.

The CRTF will undertake the following activities to implement the Outreach and Education strategy:

Key Conservation Objectives – Synthesizing Specific Action Items in Table B.9

- Increase national and international awareness of the ecological, economic and cultural importance of coral reefs.
- Inform local and regional audiences of the linkage between their actions and local coral reef health.
- Educate specific user groups (e.g., fishers, vessel owners, divers, etc.) about ways to minimize the impacts of their specific activity.
- Provide information to coastal decision-makers to influence reef conservation issues at the local, regional and national levels.

- Increase awareness of and support for the actions proposed by the U.S. Coral Reef Task Force.
- Establish a CRTF Education Coordinator to act as a key member of the CRTF Staff, and to plan and coordinate Task Force education efforts on a national and local scale, including development of a competitive grants program to support community-based coral protection activities
- Utilize and build upon existing material and successful outreach activities developed during the International Year of the Ocean and the Year of the Reef campaigns within individual governmental agencies and NGOs
- Work with NGOs, Federal agencies, educational institutions, States and Territories, and the scientific community to compile a compendium of general information that currently exists on coral reef resources.
- Coordinate with all national and international campaigns focused on protecting coral reefs.