1999
U.S. All Islands
Coral Reef Initiative
Strategy

Prepared by USAICRICC

The Territory of American Samoa
The Commonwealth of the Northern Mariana Islands
The State of Hawai'i
The Territory of Guam
The Commonwealth of Puerto Rico
The Territory of the US Virgin Islands

With assistance from
Office of Insular Affairs,
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and
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US All Islands Coral Reef Initiative Strategy

University of Hawai‘i Social Science Research Institute and the Pacific Basin Development Council with the US All Islands Coral Reef Initiative Coordinating Committee (USAICRICC), representing the Territory of American Samoa, the Commonwealth of the Northern Mariana Islands, the State of Hawaii, the Territory of Guam, the Commonwealth of Puerto Rico, and the Territory of the US Virgin Islands.

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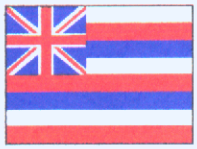

William Devick
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United States
All Island Coral Reef Initiative Coordinating Committee
(USAICRICC)

From the Islands:

The U.S. island State, territories and Commonwealths tender this document as the official 1999-2000 up-date to the 1997 All Islands Coral Reef Strategy, better known as the *Blue Book*.

This document reflects the island visions for coral reef management strategies through projects and programs that are jurisdiction specific, as well as regional, national and international in scope.

In using this document, the island Points of Contact (POC's) caution that while internal prioritization of projects may be reflected within the broad categories of effort, these priorities are not cemented in an unalterable order. Nor is any prioritization of projects *between* broad categories to be inferred. It is neither possible or desirable to develop a hierarchical differentiation between education and monitoring, or between mapping and water quality. The choice of projects or programs to be undertaken must be made on the availability of not only funds, but other support and environmental "realities of the moment" as well. It is essential that once funding levels have been determined, that the islands are able to select their own priority projects.

This document has also listed a series of regional cooperative projects, which are important. The islands have agreed, however, that for a regional project to be funded ahead of a jurisdictional project, the island POC's must first agree.

Finally, the partnership of the islands with Federal government agencies has been essential for the islands to have reached this level of unity and mutual support. This partnership has enabled the islands to develop strategies and products that are not only important to each jurisdiction, and to the islands as a whole, but to the U.S. Coral Reef Initiative effort as well.

The islands, through the United States All Islands Coral Reef Initiative Coordinating Committee, acknowledge the important contributions of the Department of the Interior, and most particularly the Office of Insular Affairs,and the Department of Commerce, and particularly the National Oceanic and Atmospheric Administration, and within NOAA, the Office of Ocean and Coastal Resource Management. Without the work and support of these agencies, there would be no U.S. Coral Reef Initiative today.

From all the islands, thank you.

MICHAEL L. HAM
Chairman

Acknowledgments

The 1999 US All Islands Coral Reef Initiative Strategy would not have been prepared if it were not for the dedication of so many people working toward the goals of protecting and preserving our precious coral reef ecosystems. The 1999 US All Islands Coral Reef Initiative strategic planning workshop occurred only with the support and sponsorship of the Office of Insular Affairs, US Department of the Interior and the National Oceanic and Atmospheric Administration. Dr. Karen Koltes and Dr. Michael Crosby have been invaluable in providing guidance to the CRI participants. In addition, Ashley Simons, who assists Dr. Koltes at DOI, was instrumental in locating the funding which enabled participants to travel from such great distances to meet prior to the Coastal Zone '99 Conference, held in San Diego.

The Points of Contact, and their designated representatives, from the territories of American Samoa, Guam, and the US virgin islands, the commonwealths of the Northern Mariana Islands and Puerto Rico, and the State of Hawaii spent hours preparing their local Coral Reef Initiative strategies prior to meeting in San Diego. The communities and agencies that participated in the preparation of their local coral reef management programs should be commended for the years of hard work and hours of devotion to CRI efforts. In addition to all of the time spent prior to the workshop, the POCs worked diligently to finalize this document quickly, despite all of their other responsibilities, to prepare for national Coral Reef Initiative meetings and project planning. The accumulative effort in each jurisdiction has been tremendous.

Further acknowledgments should be made to the continued efforts of the University of Hawaii's Social Science Research Institute and the Pacific Basin Development Council in conducting the workshops and preparing this final document. Dr. Michael Hamnett, Cheryl Anderson, Jerry Norris, and Patricia Nihi have contributed hours of work in administrative support, organization of the workshop, and facilitation of the USAICRI Strategy, building on the two previous US Islands Coral Reef Initiative planning efforts in 1994 and 1997.

The *US All Islands Coral Reef Initiative Strategy* developed from the well established collaborative effort among government agencies at federal, state, territorial, commonwealth, and local levels, non-governmental organizations, private and commercial interests, and communities. All of the people who have contributed to this effort and who care about preserving and protecting coral reef ecosystems deserve credit and thanks…For it has taken the accumulation of individual concerns and the long-term vision of healthy coral reef ecosystems to build the momentum which has produced the *International, US,* and the *US All Islands Coral Reef Initiatives* dedicated to protecting coral reef ecosystems.

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US All Islands Coral Reef Initiative Strategy
Preface

Introduction

In June 1998, the United States government adopted Presidential Executive Order 13089 for Coral Reef Protection. This declaration resulted from extensive efforts by US federal, state, territorial, and commonwealth agencies that recognized the necessity of preserving the nation's coral reefs. Years before the order was signed and working groups were formed to implement its activities, the US Islands acknowledged the importance of sustaining and protecting their coral reef ecosystems as part of an international effort. The most recent undertaking of the US Islands has resulted in the long-term strategy delineated in this document, the *1999 US All Islands Coral Reef Initiative Strategy*.

At the March 1999 Coral Reef Task Force meeting in Maui, Hawaii, the US Coral Reef Task Force (USCRTF) approved the following resolution:

> It is the sense of the Task Force that the elements of the U.S. Islands Coral Reef Initiative be considered by the [Task Force] Working Groups in the context of their current deliberations, and that the Island Initiative elements, as updated appropriately, be considered as the first priority for support with FY2000 funds as available.

Pursuant to this resolution, the island governments met in July 1999 to formalize and update their Coral Reef Initiative Strategy.

With funding assistance from the Office of Insular Affairs, US Department of the Interior (OIA/DOI) and the National Oceanic and Atmospheric Administration (NOAA), the gubernatorially designated Points of Contact (POCs) for the US Coral Reef Initiative from the territories of American Samoa, Guam, and the US Virgin Islands, the commonwealths of the Northern Mariana Islands and Puerto Rico, and the state of Hawaii gathered in San Diego for a two-day strategic planning workshop. Each of the POCs consulted committees, agencies, and experts in coral reef science and management within their individual jurisdictions to prepare strategies and project priorities presented in the 1999 updated document. During the two-day workshop, the POCs shared their ideas, collaborated on identifying new programs, and continued to build cooperative relationships to strengthen and improve coral reef protection and management.

History of the US Islands Coral Reef Initiative

The US Department of the State proposed the *Coral Reef Initiative* in 1993, and formally announced its establishment in Barbados at the UN Conference on Sustainable Development in Small Island Developing States (SIDS) in May 1994. Following that meeting, the American Flag Pacific Islands (American Samoa, the Northern Mariana Islands, Guam, and Hawaii) planned and prepared their own Coral Reef Initiative, as a grass-roots effort tailored to the needs of each jurisdiction. The islands, with participation from the four island governments, non-governmental organizations, and federal agencies, formalized the initiative at a meeting convened by the Pacific Basin Development Council in December 1994. The Caribbean (US Virgin Islands and Puerto Rico) and the Gulf States (Florida and Texas) met subsequently and developed a regional Coral Reef Initiative.

The International and the US Coral Reef Initiative reflected the increasing awareness of natural resource mangers, scientists, industry, environmental advocates, and the general public that coral reef ecosystems are essential to the health of coastal environments and provide enormous benefits. Improved scientific research has demonstrated the interconnectedness of the marine biology and ecology with coral reef health. Furthermore, concepts of integrated coastal management and a concern for non-point source pollution has heightened the awareness of the interactions between land-based activities and coral reefs, and the need to plan within the watershed context to ensure the sustainability of reef ecosystems. Scientific research has also demonstrated that human activities have widely contributed to coral reef degradation worldwide.

In many islands, these concepts of the integration of coral reefs with the overall health and well-being of their ecosystems have been long recognized. Coral reefs provide vital protection from storms and waves, habitat for fish and marine invertebrates, and an essential component of tropical island ecosystems. For these reasons, land tenure and traditional management systems extended beyond the edge of the reefs in most traditional island societies (MacKenzie 1991; Falanruw 1980). More recently, natural resource managers and local governments have come to understand the relationship between the coral reefs and coastal environment with their economic and social health, especially since many of these islands regard tourism as an essential component of their economies.

As the US Flag Islands adopted western resource management systems and legal regimes, they developed laws providing protection for coral reef ecosystems, such as restricting sand mining and fishing with cyanide (see status of reefs tables in the appendix). With improvements in scientific knowledge about coral reef ecosystems, managers have had better information from which to base their coral reef management decisions. Community groups and local governments have engaged in watershed management to protect water resources and the marine environments.

By 1995, the Pacific Islands had formed Coral Reef Initiative working groups in each jurisdiction. Volunteers for the local working groups included governmental and non-governmental interests. While some of the members worked on assessment of reefs and baseline characterization, others cleared debris from coasts and reefs, installed anchor

buoys to prevent reef damage, and improved public reef awareness for children and adults. Simultaneously, the US Department of State, the US Department of the Interior (DOI), the US Department of Commerce National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the US Agency for International Development (USAID) formed an interagency team and steering committee to coordinate the US Coral Reef Initiative.

Efforts at the federal level assisted the island governments in receiving a limited amount of funding, used to coordinate small projects and leverage funds from foundations and agencies to develop programs that address coral reef management concerns. A collaborative monitoring program began in the Caribbean, known as CARICOMP, to gather regional baseline data. In 1995, the US Islands worked separately in Atlantic/Gulf and Pacific regional working groups. However, the similarities in the management needs for the islands made it prudent for the US Caribbean Islands to coordinate their initiatives with the American Flag Pacific Islands.

In September 1997, the US Islands met in Maui, Hawaii to coordinate an island strategy for the Coral Reef Initiative. With sponsorship from the Office of Insular Affairs (OIA) within DOI and the Office of Ocean and Coastal Resources Management (OCRM) at NOAA, the Points of Contact (POCs) and other representatives from the island jurisdictions gathered to share information on programs they had developed locally. A few examples of these projects include: reef reseeding and restoration research and extensive community outreach programs in Guam; video production for coral reef education and conservation in American Samoa; the coral reef monitoring training program in CNMI; public education campaigns and the organization of an international workshop on coral reef monitoring; organization of a technical workshop on coral reef community characterization and monitoring in Puerto Rico; and, the production of a coral reef education video in the US Virgin Islands (Principal Investigator Reports in the *US Coral Reef Initiative Workshop Summary Report*, 1997, p.47-51).

The workshop results were published in the *US Islands Coral Reef Initiative Summary Report*, more popularly referred to as "the Blue Book." It outlines project strategies for coral reef management in each of the islands. The report provides the foundation for a long-term strategy, including a vision, mission statement, and goals. The document demonstrates the concern of the island governments for their coral reef ecosystems. Combined with the efforts of other government agencies, international partners, non-governmental organizations, and states, the Blue Book contributed to the formulation of the President's Executive Order.

President's Executive Order

During the June 1998 National Ocean Conference held in Monterey, California, President Clinton signed the Coral Reef Protection Executive Order (see Appendix). The order supports the International Coral Reef Initiative and recognizes the partnership among Federal agencies and state, territorial, commonwealth, and local governments, non-governmental organizations, and commercial interests in the US Coral Reef Initiative. As

a component of the executive order, federal agencies were directed to identify actions that might affect US coral reef ecosystems to "protect and enhance the conditions of such ecosystems" and to ensure that their actions will not "degrade the conditions of those ecosystems" (Executive Order 13089, Sec. 2).

The executive order established the US Coral Reef Task Force (USCRTF), with the Secretary of the Interior and the Secretary of Commerce appointed as co-chairs. The USCRTF began organizing a collaborative planning effort among the US Coral Reef Initiative partners. Five topic-specific working groups---Coastal Uses, Mapping and Information Synthesis, Ecosystem Conservation, International, and Water & Air Quality---were organized with participants from various federal agencies, universities, and state, territorial, and commonwealth governments.

As official representatives of the governors of each of the states, territories, and commonwealths with coral reefs, the Points of Contact (POCs) have participated in the task force working groups. They have also developed their own strategy specifically designed to meet the objectives and needs of the islands for coral reef management.

USAICRICC Formalized

The collaboration of the islands through regional coastal zone management conferences and other regional workshops has strengthened the working relationships among the US islands. In previous years, the islands shared innovative resource management ideas and participated in cooperative planning for coral reef management. The 1999 workshop represented the third meeting dedicated to planning the US Islands Coral Reef Initiative.

As the POCs described their local accomplishments in coral reef management for the islands, it became clear that the islands had achieved a number of successes with very limited funding. These achievements were attributed to the community-based focus, which included the contributions of volunteers from government agencies, non-governmental organizations, the private sector, and villages and communities. The Points of Contact also recognized that information gained from each other during the workshops and meetings had been invaluable in designing and implementing a number of their own projects.

The POCs decided to strengthen and improve their ongoing collaboration by formally establishing the islands' strategic planning group. The governor-appointed POCs from the islands have officially become the "US All Islands Coral Reef Initiative Coordinating Committee (USAICRICC)." The POCs also decided that the updated document should be recognized as a long-term strategy, officially called "US All Islands Coral Reef Initiative Strategy." Through consensus, the Coordinating Committee has adopted a vision (page 7) and a mission (page 7) describing goals and objectives.

Objectives previously defined in the 1997 plan and reiterated in the strategic planning workshop are to: 1) increase public education and support for the perpetuation of coral reef ecosystems and for instilling stewardship for future generations; 2) build effective

public-private sector partnerships among regional governments and organizations, educational and research institutions, and non-governmental organizations to plan and manage land and water use activities that affect coral reef ecosystems; 3) promote sound reef preservation projects; 4) develop comparable baseline data on reef status for all islands; 5) document the effects of land-based pollution sources and cumulative and secondary processes affecting coral reef ecosystems; and, 6) secure adequate financial resources and increase the technical capacity of island governments to manage coral reef ecosystems for sustainable resource use. These objectives have been accomplished to varying degrees over the last several years, but these remain the long-term objectives for each of the islands and for the Coordinating Committee.

In the process of forming the coordinating committee, USAICRICC agreed that they should explore partnership opportunities. Several programs were identified that meet the needs of at least four of the participating islands. Since most of the US Islands have limited staff and financial resources, this collaboration will enable the local CRI participants to share their resources and gain the most from their effort.

The Future of USAICRICC

The US All Islands Coral Reef Initiative Coordinating Committee recognizes that they have only begun their collaborative efforts to protect and manage their coral reef ecosystems. Regardless of the direction of the federal government, USAICRICC has determined that they will strive to achieve their vision and mission for the sustainability of coral reefs.

Many challenges lie in the future. As global warming and climate variability threaten the health of coral reefs and the long-term viability of the island ecosystems, USAICRICC is dedicated to work locally and collaboratively to minimize harmful impacts to reef ecosystems. They have maintained their local working groups and have gained momentum through increased participation by private, non-governmental, and community interests. By focusing their efforts on education and public awareness campaigns, USAICRICC and each island jurisdiction will build constituencies dedicated to the long-term protection and preservation of their coral reef ecosystems.

To this end, USAICRICC will coordinate their efforts with USCRTF working groups. This document identifies a number of projects and program priorities for each island jurisdiction that can be used to focus national efforts on improving coral reef management. Although the strategy contained in this document outlines activities for only the next five years, it establishes a strong base for future working relationships among the US Islands with a number of federal and local partners to “preserve and protect the biodiversity, health, heritage, and social and economic value of US coral reef ecosystems and the marine environment” (President’s Executive Order 13089, June 1998).

US All Islands Coral Reef Initiative Projects and Priorities

In this section of the document, each island jurisdiction presents its local coral reef initiative. Each section represents thousands of hours of work and coordination among local partners to identify pressing coral reef management needs and determine programs and projects that will address these needs. The areas of greatest concern for each jurisdiction have been included within this document, and therefore, it does not cover the full range of coral reef management concerns. These projects provide an outline of "next steps" which must be addressed to protect and preserve coral reef ecosystems.

Each jurisdiction opens with a descriptive text of the current, local situation of coral reef management. Some of these narratives detail the extent of problems that still need to be considered and others list an array of accomplishments in coral reef management that have occurred over the past few years. Even though there are many similarities among the islands' resource management needs, each jurisdiction is fundamentally different and must face separate, and often distinct, coral reef management issues.

The government structures, the local economies, and local institutional arrangements affect the ability of resource managers to respond to needs in their areas. These external factors play a strong role in determining the availability of fiscal resources, personnel, and expertise, and ultimately the extent to which each jurisdiction can address the problems. Unfortunately, there are not two or three blanket solutions for coral reef management that will address the needs of every island and every coral reef ecosystem. This is the reason that each jurisdiction has carefully and laboriously developed a coral reef strategy, detailed in the next several pages, which will best meet the objectives of protecting and preserving coral reef ecosystems.

American Samoa Coral Reef Initiative: 2000-2004

Introduction

The American Samoa Coral Reef Advisory Group comprises the American Samoa Environmental Protection Agency, the Department of Commerce (which includes the American Samoa Coastal Management Program and Fagatele Bay National Marine Sanctuary), the Department of Marine and Wildlife Resources, the National Park of American Samoa and the American Samoa Community College. The Group is charged with the policy, planning and implementation of coral resource protection programs for the Territory.

The Group has developed a plan of action for our Territory for the next five years (ASCRAG, 1999). Included in the plan are research and monitoring proposals, education projects, an enforcement program, and a plan for a legal review with the aim to modify or introduce legislation to assist in coral reef management. This project package would enable us to continue developing an understanding of the processes and impacts that affect our coral reef resources, and to tackle the human issues of public education and regulation.

The current 5-year management plan was developed through a three-day workshop held in May 1999. The workshop was a priority from our 1998 plan and was the first project completed with funding received in 1998. The workshop allowed us to develop a rigorous plan that begins in FY 2000 and extends through FY2004, with the full realization that priorities for the projects could change over the next five years, and new projects can (and probably will) be added. A complete report of the workshop is available for review (ASCRAG, 1999).

We have grouped the activities under several categories that highlight the major areas of concern that grew out of the workshop recommendations. These categories include Fisheries, Management, Reef Health, Water Quality, and Education. The workshop report summarizes the categories and the actions. It indicates which projects are currently funded and which are not. In the present report, only the currently unfunded projects are detailed below (Table 1), followed by project summaries; funding extensions in this document only show the first two years (Table 2).

Although it is a priority of the American Samoa Government to salvage the nine longliners sitting on Pago Pago Harbor reef, we do not include it here; preparation for that salvage has already begun and funds are being identified.

Update on Coral Reef Activities in American Samoa, 1997-1999

American Samoa has continued to make progress in developing and implementing programs to manage its coral reefs. The Governor's Coral Reef Advisory Group meets regularly to plan and report on activities in which each agency is engaged. Governor Tauese Sunia has shown his support for coral reef issues through his active participation at all the US Coral Reef Task Force meetings. At the Task Force meetings, American Samoa has emphasized the urgency of the islands' ongoing needs for resources to protect and manage their coral reefs.

One critical issue on the Governor's agenda has been the continued presence of nine abandoned longliners on the reef in Pago Pago Harbor. He has brought this issue to the table at past meetings and finally has begun to interest leadership at NOAA and DOI, as well as the US Coast Guard, in dealing with this problem. NOAA recently spearheaded an assessment of the reefs impacted by the wrecks and USCG has deployed a contractor to remove the remaining oil and hazardous materials. NOAA is developing a restoration plan for this project. We hope that by the year 2000, American Samoa's 100th anniversary of its treaty with the US, our prominent harbor's reefs will be free of these unsightly and dangerous hulks.

In May of this year, the Advisory Group hosted a workshop to plan the next five years of coral reef management. With the help of experts from around the Pacific region, we targeted the most serious issues facing our reefs and developed management schemes to begin tackling these issues. The workshop participants unanimously agreed that the primary threat to American Samoa's coral reefs was overfishing, that the reefs were currently overfished, and that unless steps were taken soon to begin reducing fishing pressures, particularly from the local commercial spearfishery, the fish populations would collapse. Projects were identified to address this issue. These included reinstating the subsistence fishery monitoring, monitoring the commercial fishery occurring on local reefs, a stock assessment of key species, and age validation studies. Fortunately, these projects will be funded through current grants to the Department of Marine and Wildlife Resources.

In addition to overfishing, water quality was identified as the second most serious issue facing our coral reefs, particularly in Pago Pago Harbor and some embayments with a high human population. The Environmental Protection Agency has several programs in progress, or planned, that are already funded, and we identified a few others that are not yet funded. Programs in progress address the fish toxicity issue in Pago Pago Harbor and other areas, and the continued monitoring of water quality in the islands. Since sedimentation was identified as a serious problem, projects addressing this have been proposed.

The National Park of American Samoa has begun monitoring of some of its coral reefs, and has temperature monitors on two islands. Fagatele Bay National Marine Sanctuary also deployed temperature monitors this year. In 1997, the Park funded a survey of corals and fish in the park on Tutuila Island. In 1996, The Department of Marine and

Wildlife Resources funded a survey of the coral and fish around Tutuila and Manu‘a and we are proposing a second iteration of that survey for FY2000. The Sanctuary funded another resource survey in 1998 headed by Dr. Charles Birkeland from the University of Guam, the fourth in a series of surveys that began in 1985. In addition, Dr. Birkeland and Dr. Alison Green resurveyed a (then) 78-year old transect on the Pago Pago Harbor reef that sits between several of the abandoned longliners.

Le Tausagi, an organization made up of most of the environmental educators in government, made great strides over the past few years. They have a village outreach program that takes their talents and information to the villages, they continue with their school outreach programs, they have an irregular television program that airs in Samoan, and they have a yearly environmental summer camp for elementary school children. In addition they have many activities through the year and several focus events such as Earth Day, Coastweeks, and Arbor Day. They inform through skits, songs, video, and talks making an entertaining mix of media and presentations.

Last year the American Samoa Community College opened its Le Vai Moana Marine Laboratory. This facility is available primarily to students, but also other agencies and researchers, and it can provide temporary housing for working visitors.

The Department of Marine and Wildlife Resources is beginning a community-based management project in one pilot village this year. They hope to expand this project to other villages in an effort to allow the villagers to manage their own resources. To this end, they made presentations in selected villages to introduce the concept of community-based management in partnership with the resource agency.

Enforcement of existing regulations continues to be a difficult issue for American Samoa. Enforcement agencies are under-resourced and under-staffed. With the return of the NOAA Office of Law Enforcement Agent, who works cooperatively with the Department of Marine and Wildlife Resources and the Sanctuary, we hope to improve our enforcement capabilities.

Several offices supported the publication of an invertebrate field guide for American Samoa produced by the Department of Education’s Larry Madrigal. This is a needed resource for the schools and for technicians in the field. In addition, a more general book on the natural resources of American Samoa is in press by Meryl Goldin-Rose.

Literature cited

American Samoa Coral Reef Advisory Group (ASCRAG). 1999. Workshop report and development of a five-year plan for coral reef management in American Samoa (2000-2004). American Samoa Government. 28 pp.

Table 1. Unfunded portion of 5-year plan for coral reef management in American Samoa

u = presently unfunded
f = funded

PROJECT YEARS

Unfunded Projects	FY00	FY01	FY02	FY03	FY04	Lead agency	US* task force
REEF FISHERIES							
Assess subsistence use in National Park	u	u	u			npsa	CU
Inventory harvested invertebrates		u	u			dmwr	CU
REEF MANAGEMENT							
American Samoa Marine Laboratory	u	u	u	u	u	advisory group	EC
Coral Reef Program Coordinator	u	u	u	u	u	advisory group	EC
Review all fisheries regulations	u	u			u	dmwr	E/L
Improve enforcement	u	u	u	u	u	dmwr	E/L
Meeting participation (travel)	u	u	u	u	u	advisory group	E/O
REEF HEALTH							
Reef mapping	u					advisory group	M
Expert fish/coral surveys	f/u			u		dmwr	EC
Monitor National Park reefs	u	u	u	u	u	npsa	EC
Local fish/coral surveys	u	u	u	u	u	dmwr	EC
Coral identification training	u					dmwr	E/O
Monitor Vaoto Marine Park	u	u	u	u	u	dmwr	EC
Re-establish giant clams on reefs	u	u	u	u		dmwr/nps	CU
Facility/equipment for Manu'a research	u	u				npsa	EC
College marine program enhancement	u	u	u			ascc	E/O
Crown-of-thorns plan for Ofu Lagoon		u				npsa	EC
Indicator organisms for pollution		u	u			dmwr	WAQ

Table 1 (Continued)

u = presently unfunded
f = funded

PROJECT YEARS

Unfunded Projects	FY00	FY01	FY02	FY03	FY04	Lead agency	* US task force
WATER QUALITY							
Sedimentation criteria and guidelines	u					epa	WAQ
Island-wide ocean monitoring							
a. multi data loggers/analysis	u					epa	WAQ
b. Pala Lagoon project		u				epa	WAQ
Integrated stream/coast study	u					epa	WAQ
EDUCATION							
Establish gov. task force on population	u	u	u	u	u	doc	E/O
Envirobus	u	u	u			fbnms	E/O
Marine Resource Center (library)	u	u	u	u	u	doc	E/O
Invertebrate field guide publication	u	u	u	u	u	doc	E/O
Visitor center: NPSA and FBNMS		u	u			doc/npsa	E/O
Coral Reef Video	u	u				dmwr	E/O
Workshops/Conferences	u	u	u			dmwr	E/O
Coral Reef Information materials	u					dmwr	E/O
Information Boards	u					dmwr	E/O

*** US Coral Reef Task Force Working Groups:**
CU—Coral uses
EC—Ecosystem Conservation
E/L—Enforcement/Legislation
E/O—Education/Outreach
M—Mapping
WAQ—Water and Air Quality

HIGH PRIORITY PROJECTS

A. Project: **Summary of Sedimentation Water Quality Criteria and Control Methods**

Lead Agency: American Samoa Environmental Protection Agency

Priority: High

USCRTF Reference: Water and Air Quality

Start Date: FY00

Duration: six months

Project Description

This project involves completion of a review of studies on the effects of sedimentation on coral reefs, including information on the amounts of parameters such as suspended solids and turbidity in the water column that impact coral reef health. Most development projects (seawalls, roads) in American Samoa impact the nearshore waters by erosion and contaminated storm water drainage. Contractors and regulators have experienced difficulty in effectively preventing these impacts through the use of silt curtains and other means. This project would include determining structural and nonstructural best management practices (BMPs) that have been utilized successfully in other coastal areas, and the installation and maintenance requirements of these BMPs.

Benefits

The project will provide regulators better information to establish standards for water quality for development projects and in general. We will be able to target improvements in water quality. Increased knowledge on the types of BMPs to protect coastal water quality during construction, and on their installation and maintenance requirements will decrease the impacts coastal construction has on water quality and the coral reef habitat.

Budget Estimate: $20,000

B. Project: **Integrated Nearshore and Stream Ecosystem Study**

Lead Agency: ASEPA and DMWR

Priority: High

USCRTF Ref.: Water and Air Quality

Start Date: FY00

Duration: Two Years

Project Description

Sediment plumes onto local coral reefs occur on a frequent basis, particularly following storm events. Two to three watersheds will be targeted where monitoring will be completed for one year on streams and nearshore reef habitat on a regular basis. The stream sampling will include typical water quality parameters and will be done at representative intervals along the stream to determine the major sources of sedimentation and other nonpoint source pollution impacts. This will be accomplished by targeting sampling locations to get representative data above all development, below plantations and below village development. In order to help determine the effects of the streams water quality on the reef ecosystem, the project will include nearshore monitoring for typical water quality parameters, coupled with stream and coral reef ecosystem surveys.

Benefits of Project

This project will provide an integrated look at the impacts of land-based pollution on streams and the nearshore ecosystem and will provide a baseline for determining actions by the American Samoa Government and the villages to decrease nonpoint source pollution.

Budget Estimate: $200,000 total

C. Project: **Revisions of Environmental Regulations and Laws**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Enforcement and Legislation

Start Date: FY00

Duration: 2 years, repeated in 2004

Description

In American Samoa, enactment of current conservation laws and regulations suffer from outdated and inadequate laws/regulations. Currently DMWR funding is primarily under Dingel-Johnson Act revenue sharing, which does not allow for promulgation of regulations. Local funding for these activities is extremely limited, as the American Samoan government struggles with deficit problems.

Public input and legal assistance are needed to extensively revise the fisheries, coral reef, and endangered species portions of Territorial regulations. Current regulations inadequately address endangered species protection, threats from new fishing gear (e.g. scuba fishing), and changing management strategies (e.g. community-based reef resource management).

Public input on regulations and enforcement would be gathered through surveys and public hearings held at 6 sites in the territory. DMWR staff will revise current regulations following public hearings and prepare regulation and legislation changes. Legal advice would be obtained to ensure regulations and legislation will withstand court challenges.

Benefits

Public input and involvement in formulation of proposed laws and regulations. Many of the current regulations have been adopted on a piecemeal basis which limited input concerning legal and enforcement systems. New regulations and legislation will facilitate changing approaches to reef resource management.

Budget Estimate: FY00: $20,000
FY01: $20,000
FY04: $20,000

D. Project: **Enforcement Enhancement**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Enforcement and Legislation

Start Date: FY00

Duration: 5 years

Project Description

Due to staff limitations, DMWR enforcement officers' duties are primarily in customs inspections. Field enforcement would be enhanced through the hiring and training of two new conservation officers who would be dedicated to coral reef and fisheries enforcement in the territorial waters. Training and the purchase of needed equipment and supplies would enable the new officers to professionally perform their duties.

Currently, DMWR funding is primarily under Dingel-Johnson Act revenue sharing, which does not allow for enforcement of regulations. Local funding for these activities is extremely limited, as the American Samoan government struggles with deficit problems.

Project Benefits

Benefits include increased monitoring of coral reef and fishing activities and training of new personnel in enforcement techniques.

Budget Estimate: $60,000 first year (salaries, training, equipment)
$40,000 for each of the next four years

E. Project: **American Samoa Marine Laboratory**

Lead Agency: All Coral Reef Advisory Group Agencies

Priority: High

USCRTF Ref.: Ecosystem Conservation

Start Date: FY00

Duration: Two Years

Project Description

Over the past several years, the American Samoa Government has been planning the development of a marine laboratory that would provide facilities for all agencies that have interests in marine science. A proposal was developed and a site has been identified and preliminary discussions began between the lead agencies and the landowners, a local church. The American Samoa Community College has since struck out on their own and developed the Vai Moana Marine Laboratory (see related project in this package), but the facility is too small to serve the needs of more than the college.

The facility that we propose will house the laboratories for the Department of Marine and Wildlife Resources, American Samoa Environmental Protection Agency, and can be used by visiting scientists, students and other agencies as needed. The original plan also calls for offices and an outreach facility that would include an aquarium and other exhibits.

Benefits

Because of the distance that American Samoa is from the other Territories and Hawaii, it is difficult for us to participate in or benefit from their laboratories. By having a fully equipped and staffed laboratory in American Samoa, we would be able to conduct top quality research that we need for our coral reef conservation efforts.

Budget Estimate: $150,000 year one (planning to groundbreaking)
$2,000,000 year two

F. Project: **Coral Reef Program Coordinator**

Lead Agency: Governor's Office/Coral Reef Advisory Group

Priority: High

USCRTF Ref.: Ecosystem Conservation

Start Date: FY00

Duration: Ongoing

Project Description

One scientist (PhD level) will be hired to facilitate and organize the various projects that relate to coral reef management. This person would have experience in both the scientific and administrative areas so that they can be tasked with one or more of the projects and can administer and/or facilitate the others.

Benefits

By selecting a lead person to coordinate all coral reef work, we will be able to have a clear lead who would be responsible for overseeing the results of all work, analyzing data and advising the Coral Reef Advisory Group so that together they can make decisions about future management directions and needs. Also, by having one person coordinating the projects through various agencies, there will be less possibility of duplication or friction. They would have priority for use of the various agencies' equipment, and when necessary, personnel, for field work.

Budget Estimate: $75,000 year one ($60,000 per year for salary, benefits and travel,
$15,000 first year for office setup)
$60,000 subsequent years

G. Project: **Establish the Governor's Task Force on Population**

Lead Agency: Department of Commerce

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: ASAP

Duration: Ongoing

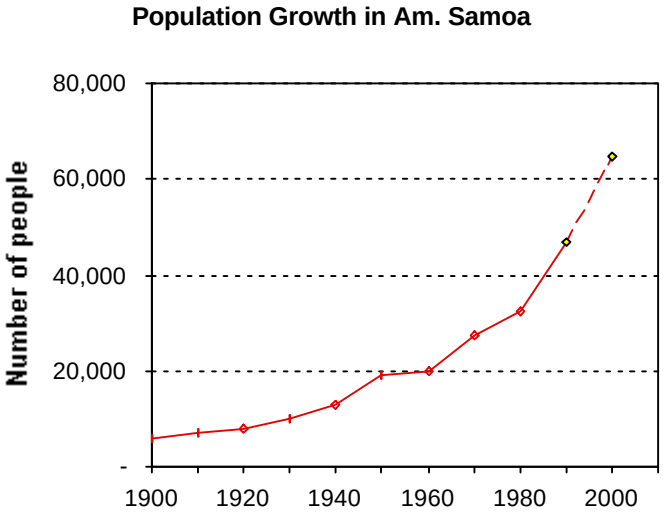
Description

The increasing human population on American Samoa (see figure below) has been identified as the primary causative agent for decline in the island's natural resources. The Governor's Task Force on Population will be tasked with determining ways to encourage a reduction in the island's population growth rate (currently 3.7%). They will publish a public awareness book for the local population in 2000, and again in 2002 after the census data have been finalized. Funding will cover meeting costs, publications and promotional costs.

Benefits

Any decrease in the island's population growth will decrease the demand on local natural resources, particularly land converted to plantation and homes. This will alleviate further pressure on coral reef resources for food, and from land use impacts.

Budget Estimate: $5,000 FY00
$2,000 FY01
$10,000 FY02



H. Project: **Expert Fish/Coral Surveys**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Ecosystem Conservation

Start Date: FY00

Duration: One year, repeated in 2003

Project Description

Quantitative surveys of the corals and reef fishes of American Samoa were conducted in 1995. While surveys with American Samoa-based personnel can help identify trends in coral reef and fish communities, it has been recommended that comprehensive assessments be performed at 3-5 year intervals.

One coral expert and one reef fish expert will repeat the surveys of 1995 over the period of one month, with the assistance of local agencies. Training for local personnel in survey techniques will be conducted. Data from the surveys will be analyzed and reports written documenting changes to the reefs and fishes revealed by the two survey sets.

Benefits

Statistically rigorous surveys of reef fish and corals are essential for the monitoring of the reef resources of American Samoa. The proposed surveys would enable direct comparison with surveys conducted five years ago. Training for personnel from local agencies would enable consistent monitoring, although on a less detailed basis.

Budget Estimate: FY00 $10,000 ($39,000 total; $29,000 committed from 1999 coral reef funding)
FY03 40,000

I. Project: **Meeting Participation for Island Members**

Lead Agencies: American Samoa Coral Reef Advisory Group

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: October 1999

Duration: Ongoing

Project Description

American Samoa is an isolated US Territory, the only one in the South Pacific. Travel to and from the Samoan islands is very expensive, and this limits the opportunities for agency members to travel to conferences, meetings, etc., that could provide important information and exposure for our Coral Reef Advisory Group programs.

Benefits

Providing an opportunity for people to attend professional meetings that they otherwise could not participate in.

Budget Estimate: $15,000 travel expense per year

J. Project: **Island-Wide Ocean Monitoring**

Lead Agency: American Samoa Environmental Protection Agency

Priority: High

USCRTF Ref.: Water and Air Quality

Start Date: FY00

Duration: Two years

Project Description

Water quality is a major factor contributing to reef health and recovery. A database on trends in water quality for the Territory has not yet been established. ASEPA plans to complete quarterly monitoring for a two year period for standard water quality parameters in the major bays in American Samoa, and install continuous measurement recording devices to measure a variety of water quality parameters (temperature, salinity dissolved oxygen, turbidity, nutrients) at a regular frequency in four bays around Tutuila Island. After two years, the data will be reviewed to refine needs for continued monitoring.

Project Benefits

The project will provide a baseline for water quality in the nearshore waters, show the trends over time related to storm events and tides and assist in determining the needs for amending Water Quality Standards.

Budget Estimate: $80,000 FY00 ($40,000 quarterly monitoring and analysis; $40,000 to purchase continuous monitoring devices)
$40,000 FY01

K. Project: **Local Survey of Fish and Coral Reef Habitat in American Samoa**

Lead Agency: Department of Marine and Wildlife Resources

Priority: High

USCRTF Ref.: Ecosystem Conservation

Start Date: FY00

Duration: 4 weeks per year over 5 years

Description

Overfishing is a serious and urgent problem impacting coral reefs in American Samoa. Even though the coral habitats are finally growing back after severely damaged by two hurricanes, the fish stock have not recovered. Monitoring of habitat and fish is necessary to assess trends in fishery resources. DMWR staff (along with trained villagers when appropriate) will conduct fish surveys for selected species, belt habitat surveys and water quality measurements at sites previously surveyed in baseline studies.

Benefits

This project will provide periodic monitoring of reef and fish communities to aid in assessing changes occurring between expert surveys.

Budget Estimate: $15,000/ year for five years

L. Project: **Coral Identification Training**

Lead Agency: National Park of American Samoa

Priority: High

USCRTF Ref.: Education and Outreach

Start date: FY00

Duration: 7 days

Project Description

The value of coral reef surveys improves when field workers have appropriate skills in the identification of coral taxa and morphologies. Given that local agency personnel have varying degrees of coral experience, it is proposed that a coral reef expert provide a brief training course in Pago Pago. Dr. Jim Maragos (USFWS, Honolulu) has indicated an interest in providing this assistance. The course would focus on familiarization with local coral genera, as well as key species. Field trips to view live corals would be undertaken, and DMWR's collection of identified coral skeletons would be reviewed for accuracy.

Benefits

The usefulness of data collected during monitoring programs would be substantially improved if key coral species and groups were accurately identified in the field, and descriptions of basic coral forms were standardized among observers.

Budget Estimate: $3,400

M. Project: **Inventory of Harvested Invertebrates**

Lead Agency: Department of Marine and Wildlife Resources

Priority: High

USCRTF Ref.: Coastal Uses

Start Date: FY00

Duration: Two years

Project Description

In 1991, octopus accounted for 51% of the invertebrate catch of the island while spiny and slipper lobster species were 5%. Anecdotal information indicates that these popular food items are becoming increasingly scarce on the reefs. The current major funding source at DMWR (Sportsfish Restoration Funds) does not allow DMWR to conduct studies for the fisheries management of invertebrate species. Consequently, there have been no studies to date concerning the octopus and lobster fisheries in the Territory. As American Samoa's population and tourism industry expand, there will be increased need for management of these species.

An invertebrate fisheries biologist would be recruited to conduct resource and habitat surveys, and gather biological information for octopus and lobster at various sites on three islands in American Samoa. At the end of the project, a report would be produced which includes population estimates and resource management recommendations for the octopus and lobster species present.

Project Benefits

The project report and recommendations will be the basis of enhanced management for these invertebrate species.

Budget Estimate: FY01 $50,000
FY02 $50,000

N. Project: **Community Conservation and Management Workshops**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: FY00

Duration: Three years

Project Description

Continuing education of the local population is an effective management tool. Three seminars a year will be conducted for traditional leaders to address resource education and management of our marine resources. An analysis of coral reef issues will be integrated into DMWR's existing Marine Conservation Plan. Here, scientists, resource managers, and education and enforcement officers meet on a regular basis with village mayors to review and discuss traditional and non-traditional issues affecting American Samoa's fisheries and coral reef resources.

One education workshop a year will be conducted for teachers to enhance their understanding regarding coral reef ecology and management. This coral reef component will be integrated into DMWR's existing environmental education workshop for educators held annually. Workshop agenda will be divided into two parts: (a) classroom session--theoretical aspects of resource conservation; (b) field work - practical, hands-on experience.

Participate in local, national and regional conferences aimed to protect coral reefs through the support of research, management, enforcement and education initiatives.

Benefits

Formalized outreach with community leaders and educators concerning coral reef issues, and increased regional cooperation for development of public education.

Budget Estimate: FY00: $9,000
FY01 $5,700
FY02 $9,000

O. Project Name: **Marine Resource Education Center**

Lead Agency: Fagatele Bay National Marine Sanctuary

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: FY00

Duration: Ongoing

Project Description

There are limited reference resources in American Samoa, and there are few books of any type available to the public that address marine issues. The Feleti Barstow Public Library construction was completed in 1998, but funding for stocking the library has been limited; currently the library is virtually empty. One priority for the library would be a marine science learning center that provides a variety of resources to the public. This would include a computer station with Internet hookup, books, videos, films, journals, and teacher materials.

Benefits

The new public library would provide a central location that housed a superior marine science learning center that would be useful to the public, students, teachers, and technical people.

Budget Estimate: $30,000 first year
$10,000 subsequent years

P. Project Name: **Envirobus**

Lead Agency: Le Tausagi, Department of Commerce

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: January 2000

Duration: 3 Years

Project Description

Marine education and outreach to date has been largely focused on schools. There is a real need for a broader village outreach program that will embrace people of all ages. Because it is difficult to get many people to come to central locations for programs, it would be more effective to take the programs to the villages. We propose acquiring a used school bus, which will sport a colorful reef/rainforest motif. The inside of the bus carries staff and equipment. The bus would make appointed visits to villages and schools. Staff would act as educators and entertainers. Displays would include informational kiosks, touch and look-only tanks, continuous videos, and other hands-on items. Staff would perform skits with costuming, puppetry, faleaitu (Samoan play), etc., to engage the audience. There would be opportunities for the villagers to participate in activities, too (reef/forest walks, guided snorkel tours, artwork, etc.) The EnviroBus would plan one full circuit of Tutuila in three years. It may even be possible to take the bus to the outer islands of Manu`a for several weeks. The EnviroBus would be available for Coastweeks, ReefWeeks, Earth Day and other coordinated environmental theme programs.

Benefits

EnviroBus program would provide a comprehensive island ecology program with focus on the coral reef.

Budget Estimate: $90,000 FY00
$46,500 FY01

Q. Project: **Coral Reef Information Materials**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: January 2000

Duration: One year

Project Description

Education coordinators need to have materials to help in their programs of marine outreach. The following printed materials will be developed and disseminated to the public:

Bumperstickers (5,000): A slogan contest will be held and the winning slogan placed on bumperstickers.

Fact-Sheet (10,000): The developed fact sheet will briefly touch on pertinent information about American Samoa's coral reef ecosystem: coral reef species, ecology and biology, regulations, conservation and management, cultural significance, education initiatives, land-based or human-induced activities affecting habitat, and the recent research developments in the Territory.

Regulations Brochure (5,000): will redesign and expand existing DMWR fishing regulations brochure to include changes to local laws and existing federal laws governing coral reefs and protected reef species. Brochure will be distributed to fishermen, schools, community groups and government agencies and be available to the public at the airport and other public places.

Costume Trunk: Costumes will be developed depicting the various species found on our reefs, and will be used to support environmental awareness skits performances during school and community outreach.

Benefits

Increased public awareness of the importance of the reef community will help promote reef and fish community health.

Budget Estimate: $13,500

R. Project: **Coral Reef Education Video**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: High

USCRTF Ref.: Education and Outreach

Start Date: January 2000

Duration: Two years

Project Description

Videos have been found to be an effective means of taking public service messages to the public. Four videos would be produced which would be specifically aimed at the American Samoan public:

Sing-Along Video for Kids: A five-minute animated video targeting children up to 10 years old. The video would be part of a teachers' education package and would supplement DMWR's existing coral reef coloring book for this age group. A meeting with experts in child development and playwriting will be held to put together an innovative format and script for the children's sing-along video.

Reef Skits and Music Video: A 10-minute video for the general public, featuring skits and songs scripted and produced by local individuals and youth groups. Video will be used as an awareness tool to assist youth groups and others in their own efforts to promote the sustainable use and management of coral reefs in their own communities. An island-wide, youth talent competition will be conducted to provide video content. Contest categories will be broken down by age-group and talent, with overall theme evolving around the significance of the coral reef ecosystem in our natural and cultural heritage.

Biology and Conservation: A 20-30 minute educational video about coral reef ecology, fish and resource biology, habitat, land-based activities and impact, regulations, education initiatives and management. The 'biology and conservation' video will be based on the guidelines, terms and references provided by the DMWR and will contain materials and information regarding the following: coral reef ecology, fish and resource biology, traditional uses and cultural significance, conservation measures, regulations, education initiatives, management issues, and research development

Coral Reefs: Samoa's Livelihood: A 20-30 minute video on the cultural significance of the coral reef ecosystem in and for the people of American Samoa. Video will include interviews with village leaders and elders about the history and traditional value of coral reefs and associated resources in the 'old' Samoan way of life, relevance to legends and myths, and the impact of current conservation and management efforts to our livelihood. A meeting with traditional leaders will be held to develop an appropriate script and format for this cultural component of the video project. Part of this effort will include research and personal interviews with village elders and traditional leaders. Research and management concerns will be incorporated into the overall picture to illustrate the need of old and new ways to help preserve this important part of our natural and cultural heritage.

Benefits

Availability of these videos will enable the message of reef resources conservation to be spread to a larger portion of the community and reflect a local perspective to these issues.

Budget Estimate: FY 00: $16,000
FY 01: $42,000

S. Project: **Coral Reef Mapping**

Lead Agency: American Samoa Coral Reef Advisory Group

Priority: High

USCRTF Ref: Mapping and Information Synthesis

Start Date: FY01

Duration: One year

Project Description

Extensive mapping of the coral reefs in American Samoa has never been accomplished. Maps are necessary for accurate and effective management and for decision making. Mapping is a priority of the US Coral Reef Task Force and is represented by one of the working groups.

Project Benefits

Maps will be utilized in all of our research and monitoring programs, with GIS, and with education and enforcement programs.

Budget Estimate: ??

MEDIUM PRIORITY PROJECTS

T. Project: **Indicator Organisms of Pollution in American Samoa**

Lead Agency: Department of Marine and Wildlife Resources

Priority: Medium

USCRTF Ref.: Water and Air Quality

Start Date: FY00

Duration: Two years

Project Description

Department of Marine and Wildlife Resources (DMWR) staff conduct surveys for land use permits, monitoring reef health and documenting current reef conditions. Knowledge of pollution indicator organisms would enhance the quality of these surveys. This information would also be a valuable teaching tool to educate high school students of pollution in the coastal waters of American Samoa.

A marine biologist would be hired on a two-year contract. A literature search would be conducted on macroscopic tropical marine indicator organisms. Benthic and intertidal surveys would be conducted to relate organisms present in American Samoa to know pollution/water quality. A technical report detailing findings of the study would be issued as a part of DMWR's Biological Report Series. In conjunction with American Samoa Department of Education, a field study guide for high school biology classes would be developed and tested with one high school class. Five hundred field guides would be published for distribution to high schools and libraries.

Project Benefits

Information from this study will be very useful to American Samoa EPA and DMWR when conducting rapid assessments of biota before and after projects affecting the fringing reef. High school students and teachers will benefit from a different viewpoint of the marine life of the Territory.

Budget Estimate: FY01 $44,000
FY02 $44,000

U. Project: **Re-establish giant clams on reefs in American Samoa**

Lead Agency: DMWR and NPS

Priority: Medium

USCRTF Ref.: Coastal Uses

Start date: FY00

Duration: 4 years

Project Description

Tridacnid giant clams are a prized food item that is seriously overfished in American Samoa. Densities are so low that their reproductive success may be jeopardized in the territory (Green and Craig 1999). Attempts to augment the harvest by farming hatchery-reared clams has not been overly successful after 10 years of effort in American Samoa.

To rebuild natural stocks, we propose to implant hatchery-reared native giant clams (probably *Tridacna maxima)* on two local reefs. Trials would be conducted to determine the most successful means of field implantation, using as variables: clam size, method of attachment to the reef, season, habitat (2 depths, 2 bays), and protection (with and without protection from natural and human predators). Clams would be individually numbered and monitored at daily, weekly or monthly intervals, as appropriate. Success would be determined as the percent survival of implanted specimens over time.

This project would be conducted by a new biologist. DMWR would provide in-kind support (boats, diving). Prior to initiating field efforts, a thorough review of the literature would be conducted to build upon efforts elsewhere in the Pacific.

Benefits

Giant clams are an important food item in American Samoa, but local reefs have been overharvested. This program would attempt to rebuild native stocks on local reefs.

Budget Estimate: $160,000 ($40,000 per year)

Literature cited:
Green, A., and P. Craig. 1999. Population size and structure of giant clams *(Tridacna maxima)* at Rose Atoll, an important refuge in the Samoan archipelago. Coral Reefs, 18: in press.

V. Project: **Facilitate research of coral reefs in the outer islands of American Samoa**

Lead Agency: NPS

Priority: Medium

USCRTF Ref.: Ecosystem Conservation

Start date: FY00

Duration: Long-term

Project Description

At present, it is logistically difficult to monitor coral reefs in the outer islands of American Samoa, where there are no research vessels, field laboratories, compressed air for scuba divers, or secure storage space for scientific equipment. All logistics must be organized and deployed from the main island of Tutuila. Several agencies (NPS, DMWR, EPA) have a need for small field offices in these islands. We propose beginning with a multi-agency field station on Ofu Island. This proposal would establish a modest field station, complete with a small boat, vehicle for ground transport, and basic scientific equipment for field operations.

Benefits

This proposal would facilitate research and monitoring of coral reefs in the outer islands of American Samoa, which currently receive little study due to the logistical difficulties of conducting fieldwork there.

Budget Estimate: $46,000 (Year 1= $34,000 Year 2= $12,000)

W. Project Name: **College Marine Program Enhancement**

Lead Agency: American Samoa Community College

Priority: Medium

USCRTF Ref.: Education and Outreach

Start Date: October 1999

Duration: Six months

Project Description

Le Vai Moana Marine Laboratory opened in 1999 to provide marine science facilities to the college community, government agencies and visiting scientists. The Laboratory is located near the sea, but does not have running seawater to the facility, an important commodity for research and education programs. We propose a seawater pump facility to the laboratory.

Benefits

Having a running seawater capability will allow the facility to conduct experiments, hold marine life, and would be an attraction to scientists who would need this in their work. It will also be available to government agencies for monitoring/research projects.

Budget Estimate: $8,000

X. Project: **Coral Reef Information Boards**

Lead Agency: Department of Marine and Wildlife Resources (DMWR)

Priority: Medium

USCRTF Ref.: Education and Outreach

Start Date: January 2000

Duration: One year

Project Description

Ten information boards or signs would be designed, constructed and installed at selected sites in American Samoa. Signs would be bi-lingual and summarize local and federal regulations about corals and reef species conservation, with a coral reef campaign slogan and illustrations of examples of protected species. Local village officials would be consulted concerning local coral reef issues, which would be reflected in sign design for each location.

Benefits

Signs would have high visibility and address local coral reef conservation issues.

Budget Estimate: $20,000

Y. Project: **Vaoto Marine Park Monitoring**

Lead Agency: Department of Marine and Wildlife Resources

Priority: Medium

USCRTF Ref.: Ecosystem Conservation

Start Date: January 1, 2000

Duration: 5 years

Project Description

Vaoto Marine Park, on the island of Ofu in eastern American Samoa, was established in the early 1990's for mitigation of reef damage from a harbor project. Current management of this area is non-existent. This project would establish baselines for fish and habitat using belt transect techniques. Artisanal fishing (allowed in the park agreement) would be monitored during 6-one week intervals to provide estimates of fishing within the area.

An interpretive sign would be erected adjacent to the airport to inform visitors about the park and non-destructive methods of enjoying the park resources. The sign would be updated every two years.

Project Benefits

Important baseline information about the park would be obtained to aid in park management. Public awareness of the park and appropriate utilization would be enhanced.

Budget Estimate:

FY00: $17,000
FY01: $15,000
FY02: $17,000
FY03: $15,000
FY04: $17,000

Z. Project: **Produce and Publish Invertebrate Handbook**

Lead Agency: Department of Commerce/Department of Education

Priority: Medium

USCRTF Ref.: Education and Outreach

Start Date: FY2000

Duration: 5 years

Project Description

The "Field Guide of Shallow Water Marine Invertebrates of American Samoa," published in 1999 by Larry Madrigal, provided a vital reference for local coral reef invertebrates. However, this publication focused on the intertidal and shallow regions of the reefs.

The purpose of this project is to carry out an exhaustive survey of invertebrates. It is proposed to examine a range of localities, range of depths, habitats and substrates (e.g. soft sediment, rubble, stony coral, soft coral, calcareous algae). Then organisms will be photographed and information on coloration, habitat, size, distribution, biological associations among species, and other pertinent observations on behavior and ecology would be recorded and provided with each color photograph in a published book.

Completed sections of the book would be provided on an annual basis.

Benefits

The value of the book would not only provide a resource management database, it would provide pertinent ecological information about local marine invertebrates that is presently lacking in the territory.

Budget Estimate: FY00-03: $25,000 ; FY 04: $50,000 Book publication costs
This would include:
Supplies (film, developing, batteries, computer software)
Postage for specimens to be sent to institutions for identification
Camera equipment
Travel and accommodations for primary investigator and visiting scientist to the territory
Dive tank fills and boat rentals
Salary for the primary investigator and secondary investigators

Table 2. Summary of unfunded projects proposed for American Samoa from FY2000-2001. The order of projects does not denote priority ranking. Final decisions will be made based on funding availability.

	FY2000	**FY2001**
High Priority (not ranked)		
Sedimentation Criteria and Controls	$20,000	
Integrated Nearshore and Stream Ecosystem Study	200,000	
Revisions of Environmental Regulations and Laws	20,000	20,000
Enforcement Enhancement	60,000	40,000
American Samoa Marine Laboratory	150,000	2,000,000
Coral Reef Program Coordinator	75,000	60,000
Expert Fish/Coral Surveys	10,000	
Establish Governor's Task Force on Population	10,000	2,000
Meeting Participation for Island Members	15,000	15,000
Island-Wide Ocean Monitoring	80,000	40,000
Local Survey on Fish and Coral Reef Habitat	15,000	15,000
Coral Identification Training	3,400	
Inventory of Harvested Invertebrates	50,000	50,000
Community Conservation & Management Workshops	9,000	5,700
Marine Resource Education Center	30,000	10,000
Envirobus	90,000	46,500
Coral Reef Information Materials	13,500	
Coral Reef Education Video	16,000	42,000
Coral Reef Mapping	??	??
Total High Priority Projects	**866,900**	**2,346,200**
Medium Priority (not ranked)		
Indicator Organisms of Pollution in American Samoa	44,000	44,000
Facilitate research of coral reefs in the Manu'a Islands	34,000	12,000
Re-establish giant clams on reefs in American Samoa	40,000	40,000
College Marine Program Enhancement	8,000	
Coral Reef Information Boards	20,000	
Vaoto Marine Park Monitoring	17,000	15,000
Produce and publish invertebrate handbook	25,000	25,000
Total Medium Priority Projects	**196,000**	**141,000**
Total by Year	**$1,062,900**	**2,487,200**

Commonwealth of the Northern Mariana Islands Coral Reef Initiative Projects and Programs For Fiscal Years 2000 – 2005

Introduction

The Commonwealth of the Northern Mariana Islands (CNMI) Coral Reef Initiative has developed and matured in response to the tremendous growth and interest in the Coral Reef issues throughout the world. In partnership with the National Oceanic and Atmospheric Administration (NOAA) and the Department of Interior (DOI), the CNMI developed the 1997 U.S. Islands Coral Reef Initiative "Blue Book," a Local Coral Reef Initiative for 1998, and a new set of projects and programs for years 2000 – 2005.

Development & Projects

Several important events have influenced the CNMI's Local Coral Reef Initiative. In 1997, Governor Froilan C. Tenorio proclaimed 1997 as the "Year of the Coral Reef" recognizing that the health of the coral reefs significantly influences the quality of life in the CNMI, and that preservation and protection of coral reefs was of paramount importance. Perhaps the most significant event was President Clinton's Executive Order on Coral Reefs and the creation of the U.S. Coral Reef Task Force (USCRTF). The Honorable Governor Pedro P. Tenorio along with the other islands governors were appointed as full members of the task force.

The CNMI developed a Local Coral Reef Initiative for fiscal year 1998, which has been funded by the DOI, Office of Insular Affairs (OIA). These projects include the development of culturally appropriate coral reef educational materials; support for the marine monitoring team; the development of an educational CD on coral reef ecosystems; support for the Coastal Resources Management Office (CRMO) travel to coral reef conferences; the conservation and placement of interpretive signs; and a small scale reef restoration and establishment project. Many of these projects are underway or will be initiated in the near future.

The CNMI has also achieved several coral reef related accomplishments on its own. These projects include the establishment and operation of the Marine Monitoring Team (MMT). The team monitors long term changes in the health of the coral reef at eight (8) fixed stations on Saipan, Tinian and Rota. Other significant coral reef related projects include the establishment of the first CNMI Non Government Organization (NGO) Coastal/Coral Reef Conservancy Group; the Coastal Resources Management Office sponsored a school poster contest on coral reefs; expeditions to the Northern Islands; and various training courses from the University of Guam Marine Laboratory on coral biology and monitoring techniques.

New Projects

The recently completed set of Local Coral Reef Projects for the fiscal years 2000-2005 include several exciting and worthwhile projects including; the establishment and management of Marine Protected Areas (MPA's); a state of the reef report; and the protection of coral reef associated wildlife among other excellent projects.

Conclusion

The Coastal Resources Management Office and the Office of the Governor will continue to work with National Atmospheric and Oceanic Administration and Department of the Interior to conserve and protect the CNMI's coral reef resources. The future holds great promise and only through a partnership can we ensure these resources will be available for futures generations to enjoy and admire.

A. Project Name: **Establish and Manage Marine Protected Areas (MPAs)**

USCRTF Cross-reference: Ecosystem Conservation

Lead Agencies: Department of Lands and Natural Resources (DLNR), Coastal Resources Management (CRMO), Division of Public Lands (Submerged Lands)(DPL)

Priority: High

Length: Ongoing (permanent)

Project Description

The intent of this project is to establish protected areas within the Commonwealth of the Northern Mariana Islands' territorial waters near Saipan, Tinian, and Rota to protect and manage important coral reef ecosystems. This project includes the formation of community-based Steering Committees on each island composed of representatives of various interest groups. Elements of the project include: defining compatible uses for protected areas; identifying criteria to select marine protection areas; surveying alternative sites (the federal mapping program could provide assistance for this step); delineating sites, legally designating and demarcating sites; preparing and implementing management plans; promulgating regulations for protected areas; conducting monitoring and maintenance activities; and, conducting education and enforcement activities.

The Commonwealth of the Northern Mariana Islands (CNMI) understands the benefits of employing a community-based approach to establish and manage marine protected areas. We also recognize the benefits of allowing multiple uses in protected areas rather than restricting access, so long as the uses are non-destructive. If a protected area is intended to change the behavior and values of the community, it is necessary for all stakeholders to be involved in the establishment and management of these areas. This allows the community to understand the need for restrictions, establishes sustainable use of resources, and limits access to protected areas and allows the community to take credit and develop a sense of ownership for the protected area. Community involvement ensures that all needs are considered and reduces the likelihood of future conflict.

The management plan would reflect the objectives prioritized by the steering committee for the marine protected area, relevant legislation, interagency agreements, and regulations which would be formulated by the Department of Lands and Natural Resources (with the assistance of outside consultants). Management plan programs for individual protected areas may include:

- Baseline inventory: Assess the status of natural resources, historical resources, level of resource extraction, cultural use, etc., for the protected area.

- Zoning: Zones may include a core area where no resource extraction is permitted, buffer zones, recreational zones, rotating protected reserve zones, sustainable yield harvest zones, cultural and historical zones, traditional use zones, and target species zones (targeted plant or animal species are protected in this zone, where the zone may be closed during part of the year, such as during the breeding season of groupers). Define rules for each zone, and promulgate regulations by appropriate CNMI regulatory agencies to implement the zoning plan.
- Research and monitoring.
- Education and interpretation.
- Facilities and equipment.
- Administration and maintenance.
- Staff requirements.
- Enforcement: A strong emphasis will be placed on education as an enforcement tool. Community groups represented on the protected area's Steering Committee could form volunteer patrols to enforce the protected area's rules. However, it may be necessary to create an enforcement unit whose sole task is to monitor the Marine Protected Area
- Training.
- Adaptive management: Evaluate and modify the management plan as necessary.

Budget estimate: $375,000

B. Project Name: **CNMI *State of the Reef* Report**

USCRTF Cross-reference: Ecosystem Conservation/Education and Outreach

Lead Agencies: Coastal Resources Management (CRMO), Division of Environmental Quality (DEQ), Department of Lands and Natural Resources/Division of Fish and Wildlife (DLNR/DFW)

Priority: High

Length: Initial Research 2 years - Ongoing updates

Project Description

The Commonwealth of the Northern Mariana Islands (CNMI) has developed a Long-Term Marine Monitoring Program that enables government agencies to monitor the coral reef ecosystems and to detect long-term changes in the reefs. This program is locally based and carried out by the technical staff of several CNMI agencies. The data collected are basic, and while useful, do not provide a definitive analysis state of the CNMI's reefs. This *State of the Reef* analysis and report will involve an analysis of historical and recently collected data, collection and analysis of supplemental data (not collected as a part of the existing Long-Term Marine Monitoring Program), and the development of a locally coordinated mapping program.

The *State of the Reef* report will enhance the exposure and knowledge of coral reef issues in the CNMI at the local, national, and international level. Issues include coral reef diseases and stresses, and regional and global effects (i.e., El Niño, global warming, and sea level rise), and the effects of overfishing. An initial report will be produced for policy-makers, government agencies, fisherman and anyone interested in the CNMI's coral reefs and who want to learn more about what needs to be done to protect them. The first report will serve as a baseline against which future research can be measured and will lay a foundation for future management and policy efforts. The report will outline specific strategies and recommend actions to protect the CNMI's reefs.

The first year's *State of the Reef* will focus on the nearshore reefs of the three populated southern islands (Saipan, Tinian, and Rota). Future year's reports will cover off-shore reefs and reefs surrounding the twelve remaining islands of the CNMI.

Analysis of historical and recent data will involve looking at:

- Department of Defense maps, bathymetry, studies.
- Data collected by University of Guam, University of Hawaii, and other research institutions as a part of regional or specific studies like EIA reports.
- Data collected through earlier CNMI agency efforts.

- Data collected by the Marine Monitoring Team (including water quality, sedimentation rates, broadscale surveys, Line Intercept Transects, Butterflyfish surveys, and Point Intercept Quadrats).
- Fishing Creel surveys.

New data that will be collected include, but are not limited to:

- Diseases of coral reef organisms.
- An analysis of anthropogenic stresses (including recreational activities, non-point source and point source pollution, and commercial and recreational reef fisheries).
- Coral recruitment.
- Measurement of typical coral growth rates for the region.
- An estimation of fish stocks and recruitment.
- Commercially important macro-invertebrates (incl. sea cucumbers and octopus).
- Monitoring strategies for these new efforts that can be implemented by the Marine Monitoring Team will be developed.

The mapping long-term monitoring program will include:

- Gathering existing data and maps (DOD, NOAA, Japan, etc.).
- Conducting baseline studies.
- Developing a standard methodology.
- Selecting sites and placing monitoring devices.

Budget: $150,000

C. Project Name: **Coral Reef-Associated Wildlife Protection**

USCRTF Cross-reference: Legislation and Judiciary/Enforcement

Lead Agencies: Department of Lands and Natural Resources/Division of Fish and Wildlife (DLNR/DFW), Attorney General's Office (AG)

Priority: Medium

Length: 1 year

Project Description

This project intends to do the following:

- Bolster the capacity of the CNMI to implement and enforce existing regulations that protect coral reef organisms.
- Prevent overfishing of coral reef fish and other coral reef-associated animals.
- Develop a collaborative enforcement framework between relevant federal and CNMI enforcement agencies to implement CNMI and federal laws that protect coral reefs and associated organisms.
- Evaluate existing regulations.
- Develop new or modify existing regulations.
- Identify an implementation strategy.
- Bolster regulatory efforts and capabilities.

Budget: $50,000

D. Project Name: **Marine Monitoring Team Capabilities Upgrade**

USCRTF Cross-reference: Ecosystem Conservation

Lead Agencies: Coastal Resources Management (CRMO), Division of Environmental Quality (DEQ), Northern Marianas College (NMC)

Priority: Medium

Length: Long Term

Project Description

The international community recognizes that the rapid decline of the world's coral reefs is a global problem that requires immediate action on a local, national, and international scale. Nearshore fisheries, shoreline protection, and tourism-based economies throughout the world are threatened by the destruction of coral reefs caused by climate change, sea level rise, pollution, and over-fishing. Researchers at the 1992 International Coral Reef Symposium held in Guam recognized the need for widespread monitoring of coral reefs and put out a call to develop standard monitoring techniques. Consequently, the Australian Institute for Marine Sciences (AIMS) developed standard techniques to monitor coral reefs (English, 1994). The Intergovernmental Oceanographic Commission (IOC) of UNESCO and the United Nations Environment Programme (UNEP) adopted the ASEAN-Australia method as the standard for global monitoring of coral reefs.

In 1996, the CNMI developed a Long-Term Marine Monitoring Program, based upon these internationally accepted standard techniques. The team has been conducting monitoring studies for the past three years and has accumulated a large collection of data and gained a more complete understanding of the CNMI's reefs. The data have been used in local permitting decisions, to help establish marine protected areas, for public education and awareness, and by international researchers. The CNMI's successful Long-Term Marine Monitoring Program is unique and can serve as a model for other US States and small island-nations.

Funding for the Long-Term Marine Monitoring Program is sporadic and from various sources. It relies upon staff members who are overextended on other projects. A grant from the Coral Reef Initiative can serve as a dedicated source of funding for the Marine Monitoring Team for the next five years. During this time, short- and long-term goals will be developed, and a continuous source of funding will be sought. Special projects and required quality control tasks will be conducted to improve the capabilities of the Marine Monitoring Team.

Tasks and other aspects of this project include:

- Additional training for new members and technique standardization from AIMS.
- Visits to similar countries conducting surveys using AIMS techniques to observe efforts and learn technique modifications.
- Archival of data (possibly in ICLARM or NODC) and training in database management and data analysis for team.
- Establishment of monitoring sites for Marine Protected Areas.
- Increased communication and support from area researchers (i.e., University of Guam, University of Hawaii, Palau Conservation Society)
- Participation in global Coral Reef meetings, such as the 2000 International Coral Reef Symposium.

5-year budget estimate: $100,000

E. Project Name: **Marine Debris Removal**

USCRTF Cross-reference: Coastal Uses

Lead Agencies: Division of Environmental Quality (DEQ), Coastal Resources Management (CRMO), U.S. Coast Guard

Priority: Medium

Length: Long Term

Project Description

Funding for this project will help to remove marine debris, including net bundles, plastic garbage and other fishing lines from coastal areas of the Northern Islands. Research has found that net bundles, mainly trawl nets which are thought to originate primarily from the demersal trawl fisheries in the Bering Sea, become snagged on coral and continue to kill fish, damage the reef substrate, and kill marine mammals. Research also has shown that plastic objects, such as lighters, light-sticks, and toys are consumed by adult seabirds, and the parents in turn pass these objects on to chicks who succumb to the effects of toxins within the plastics or die when the plastic objects pierce their stomach or block their intestines.

Funds are needed to cover transportation and equipment costs. Efforts will be coordinated with NOAA and USCG.

5-year budget estimate: $25,000

F. Project Name: **Research Coral Reef Recruitment**

USCRTF Cross-reference: Ecosystem Conservation

Lead Agencies: University of Guam (UOG), Division of Fish and Wildlife (DFW)

Priority: Medium

Length: Long Term

Project Description

The project team will conduct research to better understand coral recruitment. Researchers at the University of Guam are leading the international community in conducting coral reef recruitment studies, which include studies on the effects of pesticides on planular larvae settlement.

This grant will provide funding for direct assessments to be made in various locations throughout the CNMI, including the Northern Islands and surrounding large development projects in the southern islands. The results of the studies will be used by CNMI agencies to better enforce permit conditions that require large developments to more thoroughly analyze the effects of their projects on the future health of the nearshore environment.

5-year budget estimate: $50,000

G. Project Name: **Nutrient Reduction Strategy for Nearshore Marine Waters**

USCRTF Cross-Reference: Water and Air Quality

Lead Agencies: Division of Environmental Quality (DEQ), Coastal Resources Management (CRM)

Priority: Medium

Length: Short Term (3 years)

Project Description

Nutrient loading on coral reefs can have a devastating effect on the ecosystem and lead to the loss of productive fisheries and the functional and scenic values of reefs. In 1997, the Commonwealth of the Northern Mariana Islands (CNMI) developed nutrient criteria for the Water Quality Standards. The criteria were not based on local data and may not be applicable for local situations or may not be protective of coral ecosystem health.

The Clean Water Action Plan, issued by Vice President Gore, recognized the need for research to improve the basis for understanding and assessing nutrient over-enrichment problems. Consequently, EPA developed a strategy to establish an objective, scientifically sound basis for assessing nutrient over-enrichment problems and is developing nutrient criteria on a regional basis. However, this strategy did not include the CNMI or other Western Pacific islands in their designated ecoregions.

The project team proposes to develop a strategy to assess nutrient levels in CNMI (including the Northern Islands), assess nutrient over-enrichment problems (including those from natural oceanographic processes), determine potential sources and strategies to eliminate anthropogenic these sources, and revise nutrient criteria if necessary. One objective is to develop a long-term monitoring and research program to relate nutrient enrichment to coral reef ecosystem dynamics.

5-year budget estimate: $100,000

Guam's 5-Year Coral Reef Initiative Program for Research, Monitoring, Enforcement, and Education

Introduction

Guam has had a full slate of activities directly related to addressing issues of coral reef ecosystem management and protection, with funding from a variety of sources.

Research Activities

Under this general heading, the following nine particular actions stand out:

- The Guam Coastal Management Program contracted to study contaminated soil levels in Guam's boat harbors and marinas, in order to determine health considerations in harvestable biology and to address needs in dredge spoil disposal.
- University of Guam Marine Laboratory: Dr. Charles Birkeland has been conducting settlement studies to determine change in recruitment of corals over the past twenty years.(CRI funds)
- University of Guam Marine Laboratory: Dr. Robert Richmond has been researching reseeding practicality for areas impacted by sedimentation. (CRI funds).
- Legacy funds are being used to determine current patterns around Andersen AFB marine resource preserve to determine expected levels and directions of recruitment of resources.
- Historical data on benthic community percent cover is being compared to existing cover in shallow reef areas presently being extensively used by personal water craft. (USFWS Sport Restoration funds).
- 1999 is the third year Guam has conducted *reef check*, which includes training and use of community divers, snorkelers, and waders to develop information on the status of corals and fishes in specific reef areas.
- Gillnet Tracking Study: Department of Agriculture is undertaking a study to document removal of abandoned gill net, unharvested take, and an analysis of historical data for fishery impacts. (USFWS Sports Restoration Funds)
- Guam Coastal Management Program will fund a project for contaminant source identification and reduction in upland areas, which empty onto Tumon Bay reef.
- Guam Coastal Management Program will fund assessment of shore area springs and ground water seeps in Tumon Bay, to identify contaminant sources and levels for reduction measures.

Restoration

Within this general category, Guam is or has undertaken eight major efforts:

- Using funds from DOI and NOAA, Guam recovered and disposed of 40,000 lbs. of debris from Supertyphoon Paka. Six tons were taken from the shallow reef areas and 14 tons were recovered in waters from 10 to 65 feet.
- Guam Coastal Management Program is taking the lead for the fourth year, for Guam's participation in the International Coastal Clean-Up. More than 1,400 volunteers per year participate in both beach and deeper water clean-ups. (Donated funds)
- Guam has now established five Marine Preserves in law, covering some 11.5% of Guam's total coastline. Research is underway to track reef and reef resource recovery over time. (USFWS Sport Fish Restoration funds).
- Guam recently installed 32 shallow water moorings at selected dive spots to reduce anchor damage. (USFWS Sport Fish Restoration funds).
- University of Guam Marine Lab and Department of Agriculture's Division of Aquatic and Wildlife Resources have joined with the private sector to undertake habitat restoration in Tumon Bay. Funded by Duty Free Shoppers (through a charity golf tournament hosted by DFS), the project will work toward resolving existing problems with storm water and nutrient loading in the bay, restoration of some corals and other resources which have been lost, and publication of a public education brochure on Bay resources and methods for protection.
- UOG Marine Lab is in the 3rd of a 4-year grant to develop environmental assessment, mitigation and restoration techniques for coral reefs. (USEPA funds).
- UOG Marine Lab hosted a one-week coral cultivation workshop. Participants included researchers and regulators from Yap, Kosrae, Palau, CNMI, American Samoa, Hawaii, Guam, and Marine Sanctuaries Program. Each individual was successful in learning the techniques for collecting corals, their sperm and eggs, fertilizing the eggs, and caring for the gametes up through larval development and the settlement process. This technique can be used to eliminate harvest of wild coral for research, pharmaceutical, medical, aquarium or ornamental uses. (Dept. of Interior funding).
- Guam Coastal Management Program is providing funding to Department of Land Management for the completion of a Territorial Seashore Reserve Plan, which is intended to control uses and activities in shallow waters (0-10 fathom), and land uses in near shore areas which may impact coral reef ecosystems.

Public Education/Outreach

Finally, Guam has undertaken seven efforts in the area of public education, awareness, and outreach, which are significant:

- Guam Coastal Management Program's monthly television show, *Man, Land and Sea* has, in the past two years, devoted nearly 30% of its program time to coral reef related subjects, which translates to more than 10 hours of prime time viewing, and as much as 83 hours of total television time on these subjects.
- UOG Marine Lab and Division of Aquatic and Wildlife Resources have produced a 23 minute coral reef video and distributed (free of charge) some 3,500 copies,

not only on Guam, but throughout the Pacific and in Washington DC. (Kids For Coral donation, other)

- Guam Coastal Management Program is purchasing and making available to high school students, aquariums, microscopes, test kits, etc., to encourage students to undertake coral ecosystem related projects for local science fairs. (CRI Funding)
- Guam is developing a "village to village road show" on coral reefs, so that persons responsible for reef science, management and regulatory duties, can take the message of conservation and use to the users at the reefs. (CRI funding).
- Students are taking the lead with assistance from GovGuam agencies, in developing a coral reef educational CD-ROM for classroom use. (CRI funds)
- UOG Marine Lab conducted a 5-week coral reef management course in 1999, aimed at researchers, regulators, conservationists, students and teachers from throughout Micronesia. (UOG funded).
- Work has begun on development of an integrated and applied conservation biology curriculum for the regional colleges. This is intended to: interest students in pursuing higher education and careers in conservation biology; train regional educators; strengthen existing personnel within regional regulatory agencies; and, provide opportunities for world-class conservation biologists to pursue education in the region and serve as mentors.

This is only a sampling of the more important efforts Guam has undertaken in the past two years, and is in no way an all-inclusive listing. Coral reef research, regulation, management and education have become a central part of coordinated efforts between the four offices that comprise the Guam Coral Reef Coordinating Committee, with significant support and participation by the Governor and his office, by private sector interests, by Guam's Delegate to Congress, and by members of the Guam community.

Summary of Projects for Guam's 5-Year Coral Reef Initiative Program

The following matrix lists projects which the Guam Coral Reef Initiative Coordinating Committee has identified as important for the improvement in management of Guam's coral reef ecosystem. While we have determined an initial prioritization of projects within the broad categories developed by the U.S. Coral Reef Task Force, there is no prioritization and can be no prioritization of projects *between* these categories. In addition, since funding specifically for coral reef projects through Congress is unreliable, Guam will always remain alert to other funding sources for these projects and, therefore, federal agencies should not assume that these priorities will remain constant. These projects, and their order of listing, is merely a snapshot of the needs which are identified at present time.

Public Education/Outreach

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Video for Airlines	$75,000					High	DAWR
Diving Workshop for Decision-Makers	$15,000		$5,000		$5,000	High	UOG
Support for Public Education	$100,000	$87,500				Med.	GCMP
Teacher Workshop	$100,000	$20,000	$20,000	$20,000	$20,000	Med.	DAWR
Interpretive Signage	$60,000	$1,000	$1,000	$1,000	$1,000	Med.	DAWR

Air & Water Quality

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Coral Reef Water Quality Monitoring Support	$160,000	$10,000	$10,000	$10,000	$10,000	High	GEPA

Coastal Uses

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Coral Reef & Fishing Reg. Pamphlet	$35,000		$2,500		$2,500	High	DAWR
Guam Reef Valuation Study	$50,000					High	GCMP

Enforcement/Legal

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Development & Formatting of Legal Regime	$5,000		$2,500		$2,500	High	DAWR
Environmental Education for Contractors	$95,000	$1,500	$1,500	$1,500	$1,500	High	GEPA
Environmental Prosecutor	$125,000	$90,000	$90,000			Med.	GCMP

Mapping & Assessment

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Reef Atlas	$370,000					High	UOG

Ecosystem

Project	year 1	year 2	year 3	year 4	year 5	Priority	Lead
Coral Reef Biological Monitoring	$90,000	$20,000	$20,000	$20,000	$20,000	High	GEPA/ DAWR
Reef Monitoring Outreach	$10,000	$2,000	$2,000	$2,000	$2,000	Med.	UOG
Baseline Coastal Resource Assessment/State of Reef Report	$370,000	$35,000	$30,000	$30,000	$30,000	Med.	UOG

Totals:
1st year: $1,650,000
2nd year:$ 267,000
3rd year:$ 184,500
4th year: $ 84,500
5th year: $ 94,500

Grant Total for Guam Projects identified above: $ 2,280,500

A. Project: **Public Education Video for Airlines**

Lead Agency: Division of Aquatic and Wildlife Resources

Duration: One year

USCRTF Area of Effort: Public Education/Outreach

Project Description

To develop an entertaining 30-minute video on the general information that the public and visitors need to ensure healthy coral reefs. This shall include the basics on coral reef ecology, how to enjoy the reefs without damaging them, primary safety concerns, and the local laws on reefs and reef resources. This video will be available in English, Chamorro, Filipino, Japanese, Taiwanese and Korean.

Benefits of Project

If this video can be played on all in-bound commercial carriers (50 passengers or more), the million plus visitors and residents arriving will be more aware of ways to prevent unnecessary damage to coral reefs, and will better be able to enjoy the coral reef experience. This will raise awareness, protect existing resources and reduce enforcement activities.

Budget Estimate: $75,000

B. Project: **Hands On Workshop for Decision-Makers**

Lead Agency: University of Guam Marine Laboratory

Duration: Five Years

Area of Effort: Public Education/Outreach

Project Description

The University of Guam, in coordination with the other, pertinent Government of Guam agencies, proposes to develop a three part workshop to provide the on-site knowledge for decision makers. The workshop would begin with a half-day session to acquaint the policy and decision-makers with the rudimentary knowledge necessary to understand the reef environment and its issues. The second and third days would include a introductory class on SCUBA, and dives on two sites, one pristine and the other an impacted reef. Both of these dives would be followed immediately by debriefing sessions to set the images and knowledge of what they've experienced in the participants minds.

Workshops could be held to accommodate the schedules of the policy and decision makers as well as to respond to weather conditions, and the debriefings could be held over an after-dive lunch. Participants should include legislators and staff, the Governor and staff, certain department directors, members of the Guam Seashore Protection Commission, and Guam EPA Board, and could also include leaders in the media.

Benefits of Project

The most important element in developing successful management regimes for coral reefs is an understanding of the resources and the issues by the political body, whether elected or appointed officials. Because the reefs are not readily accessible, it is easy to concentrate on more immediate resource or economic issues, particularly those which can be experienced. This project will make the coral reef ecosystem a reality for decision-makers and information providers, thus increasing support for science and management needs.

Budget Estimate: $15,000 first year
$ 5,000 in third and fifth years

C. Project: **Support for Public Education**

Lead Agency: Guam Coastal Management Program

Duration: Two years

Area of Effort: Public Education/Outreach

Project Description

The long term protection, management and understanding of Guam's Coral Reef ecosystem is dependent upon developing a "local" pool of trained and educated people for management positions. Public middle and high schools do not have the luxury of fully equipping science labs in order to give opportunities for students to gain a more than passing knowledge of the marine environment.

In order to develop both the interest and the knowledge, the four public high schools need to be equipped with marine related test and analysis equipment for the high school science class rooms, including water and air pollution test kits, microscopes, aquarium equipment, etc.

In the second year of this project, beginning level equipment will be furnished to Guam's seven middle schools to better prepare students as they enter high school and to increase the interest in marine sciences at an earlier age.

Benefits of Project

This would allow a better "general" education effort, as well as give the support for further individual efforts in students that wish to do more. In the long run, this effort could better prepare students for entry level positions in the government agencies with coral reef responsibilities.

Budget Estimate: $100,000 ($25,000 per high school) first year
$ 87,500 ($12,500 per middle school) second year

D. Project: **Teacher Workshop**

Lead Agency: Division of Aquatic and Wildlife Resources

Duration: Five Years

Area of Effort: Public Education/Outreach

Project Description

To develop and implement a three week continuing education teacher workshop on how to teach coral reef science in primary and secondary schools. This will require the development of suitable curriculum, development of instruction materials and identification of suitable instructors. Additionally, collaboration with the University of Guam and the Department of Education will be required to establish a continuing education program.

Benefits of Project

Guam's school system has grown to a point that resource managers can not visit classrooms frequently enough to provide the long-term education needed on coral reef systems. A teacher training program will broaden the educational exposure tremendously and ultimately increase student education. This program will provide instruction materials that will increase the effectiveness of lessons.

Budget Estimate: $100,000 for first year
$ 20,000 for each year thereafter

E. Project: **Public Education Interpretive Signs**

Lead Agency: Division of Aquatic and Wildlife Resources

Duration: One Year

Area of Effort: Public Education/Outreach

Project Description

There is an increasing need to ensure that the community and visitors have an appreciation for Guam's coastal resources and an understanding of how to contribute to preserving and protecting these magnificent ecosystems. Guam specific public education signs will be strategically placed to provide information about the coral reefs in each respective area. Information provided will include guides to coral reef fauna in the area, recommended actions to protect resources, and safety considerations.

Benefits of Project

Guam's coral reefs are subjected to many impacts on a daily basis. The million plus visitors yearly plus public use of these resources represent a tremendous potential negative impact. Education can minimize this impact tremendously while also raising awareness and appreciation for the resources. This facilitates lesser needs for enforcement actions, and increases the community connection with their environment.

Budget Estimate: $60,000 first year
$ 1,000 each following year for maintenance.

F. Project: **Coral Reef Water Quality Monitoring Support**

Lead Agency: Guam Environmental Protection Agency

Duration: One year

Area of Effort: Air and Water Quality

Project Description

The successful continuation of coastal water quality monitoring, the planned biological monitoring of reefs and the surveying of damages to the reef environment from ship groundings, pollutant spills and other accidents and natural disasters, all are hampered by the need for an appropriate boat at Guam EPA. The small, aging boat presently used must be replaced soon. In order to safely maneuver through the exposed waters and frequent large waves outside the reefs, a 24 foot twin engine dive boat with trailer, a 4WD vehicle to tow it, and a secure garage for boat and monitoring equipment storage are needed. Operations and maintenance will be covered by GEPA budgets.

Benefits of Project

This boat will allow Guam's well-established monitoring of chemical, physical and microbiological coastal water quality by GEPA to continue. This monitoring will have to be suspended when the currently used boat fails. The projects will also support the proposed biological monitoring of coral reef areas and will permit GEPA and other agency response personnel to safely and rapidly respond to marine accidents and pollution incidents impacting coral reefs anywhere in Guam's waters.

Budget Estimate: $ 160,000

G. Project: **Coral Reef and Fishing Regulation Pamphlet**

Lead Agency: Division of Aquatic and Wildlife Resources

Duration: One year, with reprintings every two years.

Area of Effort: Coastal Uses

Project Description

To develop a pamphlet for public distribution which describes Guam's existing laws and regulations regarding the harvesting or protection of Guam's corals, fishes, or other reef resources.

Benefits of Project

Guam has not produced a public pamphlet on coral or fishing laws in 15 years, during which a number of major changes have been made. In addition, five new Marine Preserves have been established. This pamphlet would raise public awareness of the laws and the reasons for the laws in an easily understood and distributed format.

Budget Estimate: $35,000 for initial printing
$ 2,500 in the 3rd and 5th years for reprinting.

H. Project: **Guam Reef Valuation**

Lead Agency: Guam Coastal Management Program

Duration: One Year

Area of Effort: Coastal Uses

Project Description

Guam's coral reef contributions to the economy are easily measured in the hundreds of millions of dollars. This study will evaluate the contributions of the reef from economic activities which are directly related to the presence of the reef, such as diving, marine related retail sales, dolphin watching, jet skis, dinner cruises, etc. To reach the widest audience most effectively, both a printed study and a companion educational video are necessary.

Benefits of Project

The contribution of coral reefs to the economy is not understood because there has only been generalized efforts to determine values, based on individual interests or industries. A more thorough analysis would help the general population understand the need for protections and management measures, which they are asked to support. A more thorough analysis would help policy and decision makers understand the need for both legislative and budgetary support in management, and a more thorough understanding would help private sector businesses understand the opportunities and the need for protective action on their part.

Budget Estimate: $50,000 ($35,000 for printing - $15,000 for video production).

I. Project: **Development and Formatting of Legal Regime**

Lead Agency: Division of Aquatic and Wildlife Resources

Duration: Five Years

Area of Effort: Enforcement

Project Description

The laws, and rules and regulations needed for better management of human activities which impact coral reef ecosystems, are developed in several agencies of the government, but because of the lack of trained personnel, are not finalized in form, or developed to be consistent with those developed in other agencies.

It is necessary for the efforts of the various agencies to be compiled, and put into a format which would allow for political approval (bill form, rules, or executive order form). This would also allow for inter-agency review for discovery of gaps or over-lap. For Guam, these efforts include laws regulating harvest of corals and live rock, regulating net abandonment and spear fishing, resource collection, and some on-land activities such as rules for regulating the timing and scale of land clearing based on rainfall expectance.

This task could be completed through coordination by a paralegal, and the product would be a necessary tool for the Guam Coral Reef Policy Advisory Committee as well as for the agencies of responsibility.

Benefits of Project

Compilation and formatting of laws and rules for action by the Governor or Legislature would result in clearer mandates, and in better protection of coral reef resources. With increased attention on reef systems and their values over the past several years, the time is ripe for increased legal support for management policy.

Budget Estimate: $5,000 for the first year, with $2,500 per year in the third and fifth years for developing and formatting additional regulation as coral protection regimes become more mature.

J. Project: **Environmental Education for Contractors**

Lead Agency: Guam Environmental Protection Agency

Duration: Continuous

Area of Effort: Enforcement

Project Description

While contractors are required to take an examination to demonstrate their knowledge of contract regulations, there is no similar requirement for them to demonstrate their knowledge of the environment on which their work may impact.

Guam proposes to develop a simple certification program which would provide contractors with a basic text on Guam's environment and the impacts of development, which contractors could read on their own, and a test, passage of which would be a requirement for licensing. This effort is not intended to be onerous, but to better acquaint contractors with the reasons behind conditions placed on their skills, such as the need for erosion control and clearing and grading plans, or landscaping.

Benefits of Project

Through a better knowledge of the potential impacts of their actions, contractors can reduce negative impacts on reefs through implementation of better work habits and best management practices. The biggest problem created by contractors, erosion which leads to sedimentation on reefs, could be significantly reduced by education.

Budget Estimate: $95,000 in first year for development of workbook and tests.
$ 1,500 in each succeeding year for reprinting of test forms.

K. Project: **Environmental Prosecutor**

Lead Agency: Guam Coastal Management Program

Duration: One year, with annual support for two years, after which time the continuation will be the responsibility of the Government of Guam

Area of Effort: Enforcement

Project Description

The reasons environmental violations are either not prosecuted, or prosecution fails, is that the environmental laws are complex and based on concepts which are not as easily understood as other more generalized community laws. Guam has no person trained as an environmental prosecutor in the Attorney General's Office, and therefore must rely on efforts by attorneys with skills in unrelated areas. Unfortunately, over the past fifteen Guam has experienced the two economic conditions which lead to greater problems in environmental protection, boom and bust economies.

This project would fund an attorney with environmental law training and experience for three years, after which incorporation into the local budget process could be more feasible.

Benefits of Project

This would increase Guam's success in prosecution of environmental violations, thus increasing the effectiveness of laws and reducing violations. It would also give support for Guam's enforcement officers, who are often frustrated by the lack of Attorney General attention, or by prosecutors who do not understand the reasoning behind the laws, and are, therefore, incapable of rendering the best possible support.

Budget Estimate: $125,000 for the first year. $90,000 per year for two years thereafter.

L. Project: Guam Reef Atlas

Lead Agency: University of Guam Marine Laboratory

Duration: One Year

Area of Effort: Mapping (resource assessment)

Project Description

To develop a color-coded coastal reef atlas for Guam in printed and compact disc formats (suitable for both MacIntosh and PC environments) that clearly depicts coral reef morphology and valuable resource areas. Species of special importance, user areas, and environmental concerns will be marked appropriately. Format will include a grid system for easy area calculation and total reef area. The project will require 100 printed copies and 250 compact discs.

Benefits of Project

Resource managers, commercial interests and terrestrial developers will be given a quick reference guide that can be utilized in evaluating potential environmental impacts of actions and afford better guidance in policy and decision making.

Budget Estimate: $370,000

M. Project: **Establishment of Coral Reef Biological Monitoring**

Lead Agency: Guam EPA/DAWR

Duration: One year, with follow up for four years

Area of Effort: Ecosystem Conservation

Project Description

Biological monitoring of coral reefs is needed to evaluate and record changes in coral reef health and to complement GEPA's physical, chemical and microbiological monitoring program in Guam's coastal waters. The DAWR's biologists and GEPA's biologists have met with UOG coral biologists to coordinate biological monitoring of certain coral reef areas. A practical, efficient common approach for the two regulatory agencies to use in monitoring health of corals and coral reef organisms will be designed and started up, including a GIS database for storage and analysis of data. Coordination of use among GEPA, DAWR, UOG Mare lab, USMPS and others as well as incorporation of PACICOMP, Reef Base, GCRMN and US CRTF activities will be established. A monitoring specialist will be contracted at GEPA. Monitoring staff and UOG marine scientists will select sites and establish long term transects, protocols and data recording systems during the first 12 months. The permanent DAWR staff and UOG biologists will train GEPA staff to carry out continuous regular data collection and analysis. Two computers and GIS programs, GPS, and equipment and materials for transects will be purchased. Marine Lab scientists will donate use of their underwater video equipment and will advise on video transect establishment.

Benefits of Project

Unpredicted problems on coral reefs such as damages from diseases, recreational uses, non-point source and point source pollutants, invasion of alien species, coral bleaching, etc., will be noted. Also, changes in coral coverage, recruitment, diversity and other measures of reef health will be quantified and documented. Coral community health will be compared to water uality data and human resource uses. This monitoring will provide a comprehensive and scientific basis to direct management actions to protect Guam's reefs.

Budget Estimate: $90,000 for the first year
$20,000 each year for the succeeding four years.

N. Project: **Reef Monitoring Outreach**

Lead Agency:	University of Guam Marine Laboratory
Duration:	Continuous
Area of Effort:	Ecosystem (monitoring)

Project Description

Guam has initiated an annual *reef check up*, which involves the community in assessing the health of Guam's reefs. It would be more useful, however, if there was an organized system for collecting reef information from divers and snorkelers on a regular basis. To do this, two things are necessary.

First, there is a need for the creation and printing of waterproofed resource identification cards which could be carried in the water. These would include, at a minimum, cards identifying corals, fishes, sea grasses, and other species which are territorial and therefore can indicate an absence or presence of problems on the reefs.

In addition to the identification cards, there is a need for waterproofed checklists, which can accompany the divers and snorkelers for on-site information recording. Both the I.D. cards and checklists could be distributed from dive shops as well as from government agencies.

Second; there is a need for centralization and maintenance of data. This could be accomplished through a dedicated computer and weekly inputting of information. Monthly reports based on analysis of information provided during that period would help both the science side and management side in early identification of trends and in developing management responses.

Benefits of Project

This would provide a continuous source of information and could alert managers and scientists to problems or recoveries at the earliest stages. It would also involve the public in the management and monitoring process, thereby creating a large sense of "ownership" of the issue at the user level.

Budget Estimate:	$10,000 for the first year $2,000 per year for years 2-5 for reprinting materials.

O. Project: **Baseline Coastal Resource Assessment & Guam State of the Reef Report**

Lead Agency: University of Guam Marine Laboratory

Duration: Five Years

Area of Effort: Ecosystem conservation

Project Description

In order to better understand and convince decision-makers and the public of the actions necessary to preserve, protect and better use the coral reefs around Guam, it is necessary to determine the current status of corals, including coral cover and predominant species.

Guam will re-conduct a completed mid 1970s project "Survey and Species Inventory of Representative Pristine Marine Communities on Guam" to perform comparative status of primary resources. This study encompasses surveys of benthic algae, corals, macroinvertebrates and fishes at 12 sites. Each of these sites requires a variety of reef zones and a multitude of transects to adequately assess the resources present. Completion of the project will require statistical comparison of new information with historical information to determine changes and expected explanations.

The information will then be compiled and developed into a document which can be easily accessible by policy makers, managers, and the general public. While the information should be updated on a consistent basis, the State of the Reef Report, accomplished through this task, must be updated every two to three years, in order to demonstrate anthropogenic caused changes.

Benefits of Project

This project will enable scientists, managers and decision-makers to clearly assess the impacts of "boom" development over a 25 year period, and to suggest necessary changes to resource management, to land use planning and development conditions. It will also allow the public to better understand their impacts on their community and its resources.

Budget Estimate: $370,000 first year for the studies.
$ 35,000 in the second year for the State of the Reef Report
$ 30,000 in the third through fifth years for updating and printing

Hawai‘i Coral Reef Initiative 2000-2005
1999 Project Summary

Introduction

1998 was a pivotal year in Hawaii for coral reef protection. While President Clinton was signing the Executive Order for Coral Reef Protection, the Department of Land and Natural Resources (DLNR), Aquatic Resources Division (DAR) was hosting an international workshop on coral reef monitoring as a tool for management. The proceedings from this workshop are in press.

One of the recommendations of the coral reef monitoring workshop was that Hawaii produce a State of the Reefs Report. This 1998 report, the first ever for any state or territory within the United States, was unveiled at the U.S. Coral Reef Task Force meeting that was held on Maui in March 1999. The report is a 40-page document that outlines Hawaii's research, management, monitoring and education needs and accomplishments within the past year.

DAR was also able to hire three professional staff to focus on coral reef-related issues and management concerns. This has significantly increased the capacity of DAR to respond to coral reef issues. In addition, the 1998 State Legislature created Act 306 that mandated the creation of the West Hawaii Fisheries Management Area, a 150-mile stretch of the Kona Coast, Hawaii. The Act required DAR to set aside a minimum of 30% of the coast from the collection of aquarium fish. A community-based process was developed to establish these zones. DAR is in the implementation stage of setting aside 35% of the coast, as was determined by community input. As a part of this process, an extensive monitoring program with 24 sites has been initiated to monitor the results from the closures.

With support from Senator Daniel Inouye, NOAA allocated $500,000 to Hawaii through the University of Hawaii (UH) to develop a Hawaii Coral Reef Initiative (HCRI) Research Program. The money was to be used expressly to fund research that assisted the State in its capacity to manage coral reef ecosystems. UH and DLNR signed a Memorandum of Understanding to establish the HCRI Research Program to implement and administer research and monitoring projects that improve the overall management of coral reef ecosystems and build management capacity within the state.

Research projects already funded and underway include the Coral Reef Assessment and Monitoring Program (CRAMP), which is assessing and monitoring 31 sites statewide; a community-based decision support model project for resource management in Kaneohe

Bay; and genetic studies on differentiation of coral sub-populations. Second year project proposals have just been reviewed and full proposals are being developed.

The following projects were funded with NOAA and Department of Interior Coral Reef Initiative (CRI) money through the Hawaii Coastal Zone Management Program (HCZM) in its past capacity as coordinator of the HCRI.

Coral Reef Network Web Page*:*

This web page was designed to be a repository for education and outreach information; a directory of all state-wide coral reef groups to list their activities and current events; a means for question and answer sessions with coral reef scientists; a bibliography of coral reef publications; and a place for storing coral reef data in a common format. The web page has been posted for two years however, no new information or updates have been made since the original posting.

Educational Video:

A video segment on coral reefs ran on United Airlines and was produced for English speaking visitors. Although the original proposal was to develop a video that was multi-lingual, the funding to develop videos in additional languages was never allocated.

Additional educational projects funded by the HCZM CRI money are as follows:

- Reef monitoring program with Kauai High school students
- Coral reef brochure developed by Pacific Whale Foundation (PWF) [in draft]
- Coral reef naturalist training by PWF
- Coral reef volunteer monitoring program and training in West Hawaii w/ UH Sea Grant
- Hawksbill sea turtle monitoring and habitat assessment program with Hawaii Wildlife Fund
- Posters on Maui on how to care for reefs
- Partial funding for two educational videos on corals at Waikiki Aquarium

Additional efforts have been initiated by various State and Federal partners to discuss data and information sharing. Such initiatives included the Marine Ecosystem Geographic Information Systems (MEGIS) working group coordinated by the U.S. Fish and Wildlife Service.

As a follow up to the coral reef initiative work initiated by the HCZM Program, DAR held meetings or asked for feedback on each island to obtain additional community input in developing their priority projects. Community members were given summaries of the U.S. Coral Reef Action Plan proposals and asked to comment on these, as well as other priorities for Hawaii's coral reefs. The projects listed below reflect a summary of these priorities.

DAR will continue to work in concert with the Hawaii State Department of Health and the Coastal Zone Management Program to further conserve and protect Hawaii's coral reef resources. Ongoing management and information sharing efforts at the State and Federal level have been closely coordinated and will continue in this same manner. DAR will also continue to work with the US Coral Reef Task Force to design the best possible action plan to protect our nation's coral reef resources.

A. Project Name: **Hawai‘i State of the Reefs Report**

Lead Agency(es) and/or private interests sponsoring or collaborating:	Department of Land and Natural Resources (DLNR)/Aquatic Resources Division (DAR)
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses, Ecosystem Science and Conservation, and Water and Air Quality Working Groups
Short-term, Long-term, approximate year of start:	Short-term annually
Length (6 months, 1 year, on-going):	On-going

Project Description

Produce a printed four-color document and web page that describes the status of Hawaii's reefs annually. Provides a basis to annually review accomplishments and to articulate what still needs to be done to better manage reef resources. The document is an opportunity to summarize all coral reef-related research, management, education and community activities that have occurred in a given year.

Benefits of Project

Presents current and on-going research, management and education initiatives occurring on Hawaii's coral reefs in one document. Provides a basis for policy makers and managers to annually review where we are and where we need to go in managing and protecting our reef resources.

Budget:	$25,000 (includes lay out and design, printing and distribution costs, as well as web page formatting)

B. Project Name: **Coral Reef Emergency Response Team**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR in collaboration with Hawai'i Department of Health (DOH), Hawai'i Deputy Attorney General, University of Hawai'i (UH), US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Coast Guard (USCG), and Environmental Protection Agency (EPA)
Priority:	High
USCRTF Cross-reference:	Relates to Ecosystem Science and Conservation
Short-term, Long-term, approximate year of start:	FY 2000-2005
Length (6 months, 1 year, on-going):	On-going

Project Description

The Coral Reef Emergency Response Team would be established as a multi-agency rapid response team to deal with all major vessel groundings, chemical and oil spills and other short-term anthropogenic events where an assessment of damages to reef resources can be used to mitigate impact during the incident as well as coordinate response among federal agencies and state resource trustees. Data gathered would also be used as evidence and assist in determining appropriate restoration measures.

Benefits of Project

Benefits include a rapid ability to mobilize and assess impacts to resources at the time of occurrence in an effort to mitigate damages. The response team's members will reflect the expertise of responsible agencies to develop action plans that are drawn up expeditiously. Resources can be coordinated to mobilize appropriate strengths of all agencies involved. It is envisioned that through this multi-agency expertise in the on-site assessment, the team's recommendations will result in significant savings in time, effort and resources by agencies responsible for mitigation. The response team increases our ability to assess both short-term and long-term implications of the incident to appropriately plan for a further course of action to ensure additional resource degradation is minimized.

Budget:	$30,000every other year (includes travel, training and logistics). Additional operating funds would be recovered from each incident.

C. Project Name: **Community-Based Management/ Monitoring and Education Initiatives**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR (Grant awards will be reviewed by a collaborative group process made up of State, Federal and NGO agencies based in Hawai‘i.)
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses, Ecosystem Science and Conservation, and Water and Air Quality Working Groups
Short-term, Long-term, approximate year of start:	Annually renewed for all 5 years
Length (6 months, 1 year, on-going):	On-going

Project Description

Develop a set of criteria to provide matching funds on a one-to-one basis for community groups interested in developing one of three types of projects: a) management projects in representative reef areas that include the entire watershed as a component; b) community monitoring projects that train community members how to be better stewards of reef resources; or 3) education and out-reach projects that provide materials to change current behaviors. Grants would be approximately $5,000 each and awarded based upon a competitive proposal process.

Benefits of Project

Communities in Hawai‘i are clamoring to become involved in managing resources and the State is actively seeking means to catalyze this interest. Offering small grants to community groups that must be matched on a one-to-one basis provides them the incentives they need to implement community projects and provides the State with a means to fund these initiatives.

Budget: $50,000/year

D. Project Name: **Marine Tourism Impacts Assessment**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR in collaboration with the UH, Bishop Museum, and other research institutions.
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses and Ecosystem Science and Conservation Working Group
Short-term, Long-term, approximate year of start:	Long-term annually for all 5 years
Length (6 months, 1 year, on-going):	On-going

Project Description

This research would focus on activities that are not being addressed by current monitoring activities to fill in gaps in information on coral reef management issues that are not covered under current research regimes. Research projects would be awarded based upon a set of management criteria and/or perceived threats to resources that are established annually. Requests for proposals would be generated to select projects based on merit and need. Assessment work could be done on the impacts of non-consumptive uses at our most popular tourist destinations such as Molokini, Hanauma Bay, Waikiki, etc. Marine tourism activities, such as personal watercraft operations, may have significant impacts on shallow benthic communities and feeding or breeding patterns of schooling reef fish species. Impact from these and other new types of ocean recreation equipment need to be assessed. Data on the resource carrying capacity in heavily used dive locations, and the associated impacts that may be occurring from high use must also be assessed. To properly manage the numerous types of activities found in certain reef areas, further data and assessment is needed on the potential impacts occurring at these sites.

Benefits of Project

It is a significant management challenge for us is to try to balance the high use of resources with the need to protect the marine life, given the unique complexity of Hawaiian coral reef ecosystems. Current monitoring efforts are just beginning to address this concern and are minimal when compared to the research that must be done to assess impacts from all marine tourism activities.

Budget: $150,000 annually

E. Project Name: **Investigative Enforcement Support**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR and Division of Conservation and Resources Enforcement (DOCARE)
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Short-term, Long-term, approximate year of start:	FY 2001-2004
Length (6 months, 1 year, on-going):	On-going for all 4 years

Project Description

Establish an investigative position within the Division of Aquatic Resources that focuses solely on investigating violations that occur on coral reefs throughout the state. The investigator would work with aquatic biologists to develop sound investigative procedures to ensure better compliance and conviction. The investigator would train Conservation Officers on proper identification techniques.

Benefits of Project

Currently the State does not have the enforcement capability to respond to most ocean-related incidents that occur. There is only one investigations officer to cover all natural resource conservation violations. A dedicated individual who is able to focus on marine-related violations and train others on proper techniques would greatly increase our enforcement capabilities.

Budget:	$125,000 for FY 2001, $75,000 in subsequent years for investigation support (includes travel and equipment costs).

F. Project Name:	**Environmental Law Workshop**
Lead Agency(es) and/or private interests sponsoring or collaborating:	Department of Land and Natural Resources, Department of Health, Hawaii Coastal Zone Management Program, federal law enforcement agencies, and federal, state and county prosecutors, investigative agencies, and judges.
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Short-term, Long-term, approximate year of start:	FY2000 or 2001
Length (6 months, 1 year, on-going):	One year

Project Description

There are growing threats to the marine resources in Hawaii involving threats to wildlife and habitat resources, as well as water and coastal pollution. For example, in the Hawaiian Islands, separate individuals have been recently caught butchering sea turtles, clubbing a monk seal or using bleach on a series of reef sites. In the fall of 1998, there was a chemical based spill in Hawaii and large vessels have run aground on coral reef resources. The resources that are threatened, such as coral reef ecosystems or critically endangered marine mammals, are unique resources that need to be protected. A number of aggressive federal enforcement tools, both civil and criminal, have been developed in recent years that can address these types of problems. Many of these tools provide for opportunities for collaboration among federal and state or territorial enforcement agencies.

The proposed project is to request assistance from the relevant federal enforcement agencies to organize a workshop for federal, state and local prosecutors and investigative agencies. The workshop would provide an opportunity to share existing information and experiences about these enforcement authorities, and to explore ways the various enforcement jurisdictions can work as partners to address these serious threats. A focus on how local laws can be strengthened to better incorporate federal guidelines should also be addressed where appropriate.

A separate part of the project could involve identifying appropriate judicial forums, at both the federal and territorial or state/local levels, at which federal enforcement agencies and/or noted scientists can speak to raise awareness of the awareness of the importance of marine resources and habitats.

Benefits of Project

Raising awareness among the law enforcement community of the importance of marine resources and their habitats, along with providing specific enforcement tools can go a longs way towards protecting those resources. Coordinated enforcement efforts among federal and state or county enforcement agencies can address the problems in a more efficient and comprehensive manner. The proposed project could help generate effective enforcement actions that result in penalties sufficiently high to deter subsequent violations, and appropriate damage awards to adequately restore the resources.

Budget: $5,000 for travel and administrative costs for one or more relevant federal law enforcement agencies to coordinate and host workshop.

G. Project Name: **Linking Watersheds to Coral Reefs – The Ahupua‘a Approach to Resource Management Video**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DBEDT/Hawai‘i Coastal Zone Management Program (HCZM), DLNR/DAR, Department of Health (DOH) and Office of Hawaiian Affairs (OHA).
Priority:	High
USCRTF Cross-reference:	Relates to Water and Air Quality Working Group
Short-term, Long-term, approximate year of start:	Short-term, FY2001
Length (6 months, 1 year, on-going):	One year

Project Description

The traditional approach to managing resources in early Hawaiian culture was to manage the entire watershed from the mountaintop to the edge of the reef. Much of the traditional concepts, to manage the entire watershed in this manner, are being revived and implemented within various communities. This video would focus on the former native Hawaiian management practices and use present day examples of communities' involvement as a vehicle to teach other community groups about how to become involve. It will also stress the importance linkages that exist between the watersheds and reefs.

Benefits of Project

The video would be shown at neighborhood board meetings, community events, in schools and at meetings of various organizations to inform them of early Hawaiian management practice and how these can be implemented in modern day settings. It will serve as vehicle to get other community groups to become in involved in caring for their watersheds. Additionally, it will educate the public on the significance of the links that exist between watersheds and reefs in island ecosystems.

Budget: $25,000

H. Project Name: **Coral Reef Marketing Awareness Campaign/Social Marketing**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR in concert with DBED/HCZM and Office of Tourism, DOH, NMFS, U.S. FWS, NGO's, private businesses, and the media.
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses, Ecosystem Science and Conservation, Water and Air Quality, and International Working Groups
Short-term, Long-term, approximate year of start:	Short-term FY 2000
Length (6 months, 1 year, on-going):	One year

Project Description

Develop a marketing campaign and implementation strategy to raise awareness locally about human effects on coral reefs and the fragile nature of these ecosystems. Campaign would be structured after successful littering and drunk driving campaigns, in an effort to change people's actions, attitudes and behavior as they relate to coral reef resources. The connection between land-based actions and how they affect reef resources will also be stressed. Information would be distributed statewide and include specifics on the benefits of our coral reefs to our daily lives. In addition, videos already produced locally would be shown on airlines and on the visitor cable network to inform visitors of Hawaii's unique reef resources.

Benefits of Project

A significant reduction in social actions (among both residents and visitors) affecting coral reefs would increase the health of the reef and limit the necessity to impose additional regulatory measures to manage.

Budget:	$50,000 (Note: this project would be established in conjunction with a larger region initiative to raise awareness of coral reefs issues throughout the United States.)

I. Project Name:	**Control of Land-based Pollution/Integrated Watershed Management**
Lead Agency(es) and/or private interests sponsoring or collaborating:	DOH in conjunction with the DBEDT/ HCZM Program. An oversight committee made up of the appropriate Federal (EPA, NRCS) and State (DOH, DBEDT/HCZM, OHA, DLNR/Division of Forestry and Wildlife and DAR) and a representative NGO would be established to oversee project implementation.
Priority:	High
USCRTF Cross-reference:	Relates to Water and Air Quality Working Group
Short-term, Long-term, approximate year of start:	2002-2005
Length (6 months, 1 year, on-going):	Three years

Project Description

Develop a pilot project for an integrated management process where a reef is managed in conjunction with its adjacent watershed. The pilot project would be set up to follow the "ahupua'a" practices of the Hawaiians, where resources from the mountains to the sea are managed in a cooperative manner.

Benefits of Project

The islands' steep mountains, coupled with degrading land use practices have significantly affected Hawaii's coral reefs, which are adjacent to shore. Many areas within the state consist of very steeply dissected landscape that has been in grazing or agriculture for several decades. Over the years the watersheds have been badly damaged by long-term overgrazing or heavy use by the agricultural industry, which have failed to address critical area erosion. Coupled with steep topography and varying annual rainfall with periodic flash storm events exceeding 5 inches in 24 hours, the sediment transport from these areas has been recognized as the primary culprit for the severe degradation of reefs and coral coverage. In addition, the source, flux and fate of ground water dissolved components and how the pollutants associated with this ground water flow affects coral reefs are not well understood.

Budget:	Minimum $50,000 annually for the 3 years. Note: Funding for this project would be allocated through existing programs within EPA e.g. Section 319.

J. Project Name: **Economic Valuation of Reefs**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR and DBEDT/Ocean Resources Branch and Hawai‘i Coastal Zone Management Program (HCZM)
Priority:	Medium
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Short-term, Long-term, approximate year of start:	Short-term, FY2001
Length (6 months, 1 year, on-going):	One year

Project Description

This study would look at the value of reefs in terms direct and indirect tourism uses, fisheries resources, aesthetic values, rates of endemism, pharmaceutical product potential, and the value of living reefs for shoreline generation and storm protection. Current reef values are assigned based on a 1991 economic assessments done to determine the values of ocean industries in Hawai‘i. Further estimates have been made based upon the value of a reef ($2,833/sq. meter) done to assess damages to a reef from a ship grounding in the Florida Keys. Both of these figures greatly under estimate the value of the reef resources in Hawai‘i.

Benefits of Project

The information would be used as a basis to assess damages that occur to reef resources from high impact anthropogenic effects i.e. ship groundings, oil spills, etc. This study would certainly help to demonstrate that the value of healthy reefs goes beyond the immediate location of the reef, and is of significant value to the economic and societal health of the United States as a whole. The information would also assist in convincing policy makers that more resources need to be allocated to reef resource management.

Budget:	$35,000 (Note: this project would be undertaken as a portion of a regional study to determine the value of reefs throughout the American Flag Islands.)

K. Project Name: **Marine Debris Removal**

Lead Agency(es) and/or private interests sponsoring or collaborating:	DLNR/DAR in collaboration with NMFS, EPA, US Coast Guard, National Marine Sanctuary Program, UH Sea Grant Program, Center for Marine Conservation, industry and community groups.
Priority:	Medium
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Short-term, Long-term, approximate year of start:	FY 2000-2001
Length (6 months, 1 year, on-going):	Two Years

Project Description

The project would provide coordination of community initiatives to remove fishing nets and plastic from our reefs within the main Hawaiian Islands and to coordinate with NMFS for net removals in the Northwest Hawaiian Islands. The project would also document the extend of the problem in the main Hawaiian islands and begin to assess damages to reef resources. Funding for boat support for the efforts is also needed.

Benefits of Project

Discarded fishing nets impact the reefs in three significant ways: 1) they smother, entangle and kill the coral, 2) they transport alien species from reef to reef, and 3) they entangle other marine life including protected species such as the green sea turtles and critically endangered Hawaiian monk seal. Removal of these nets in areas with a high percentage of fragile coral cover or where high incidence of protected species occur is a necessity to ensure the long-term health of the coral reef ecosystem.

Budget:	$60,000 (includes coordinator's salary and funding for vessel support)

L. Project Name: **Coral Reef Education/Certification Program for Commercial Tour Operators Using Marine Protected Areas**

Lead Agency(es) and/or private interests sponsoring or collaborating:	Department of Land and Natural Resources (DLNR)/Aquatic Resources Division (DAR) with DBEDT and private businesses.
Priority:	Medium
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Short-term, Long-term, approximate year of start:	FY 2003
Length:	On-going

Project Description

Many of our Marine Life Conservation Districts (MLCD's) are marketed as 'must see' destinations by the tourist industry. Effects of this marketing have resulted in heavy use by dive and tour operators and required the necessity of establishing permits to limit additional growth. Average use in selected protected sites ranges between 3,000-5,000 snorkelers/divers per site daily. Patrons are often given minimal instruction on the potential impacts their use is having on the resource. Instruction on the unique organisms found within these protected areas and the ecology of the resource are also lacking.

This project would develop curriculum and a training program for commercial tour operators using marine protected areas. Taking a cue from a very successful program that has been operating in the Great Barrier Reef Marine Park, we are proposing to create a government-accredited certification program for all commercial tours operating within marine protected areas. Training would be required as a part of the permit conditions. Coordination and training would be given on every island annually due to the high turn over in staff that occurs. Instruction would include information about the ecology of the resources, identification of the marine life, regulations, best practices and reef stewardship. Training would also include how to instruct patrons to limit touching, finning and other impacts on the coral reef substrate. A quarterly interpretive newsletter for the marine tourism industry would be produced to provide continued education and management updates.

Benefits of Project

A better program of training and instruction would minimize impacts from high use. It will set up a partnership arrangement between the businesses and the regulatory agency to better protect and manage our MLCD's. Businesses that have successfully completed this training can use this as a marketing tool for ecotourism based sales. Once curriculum materials and training is developed, it can be offered by Community Colleges or private institutions with the costs for training funded by the commercial operators.

Budget: $150,000 for first year; $60,000 in subsequent years.

M. Project Name: **Mapping of Hawaii's Reefs through High Resolution Digital Photography and/or Hyper-Spectral Imaging**

Lead Agency(es) and/or private interests sponsoring or collaborating:	US Fish and Wildlife Service-Hawai'i/MEGIS Group, DLNR/DAR, Department of Business, Economic Development and Tourism (DBEDT)/Office of Planning, National Marine Fisheries Service (NMFS) and University of Hawai'i (UH)
Priority:	Medium
USCRTF Cross-reference:	Relates to Mapping and Information Synthesis Working Group
Short-term, Long-term, approximate year of start:	Short-term FY 2000
Length (6 months, 1 year, on-going):	One year

Project Description

Develop high resolution digital aerial photographs and hyper-spectral images of the priority reefs areas around the main Hawaiian Islands. Geo-reference data collected.

Benefits of Project

The availability of high-resolution digital photographs or hyper-spectral imaging of Hawaii's reefs is minimal. This information would be used for everything from updating our navigational charts to assessing where the major reef resource areas occur. Use patterns could be over-laid on to the digital maps to indicate high use areas and the activities occurring within. Information could also be used to track significant changes in shoreline or reef areas over time.

Budget:	$650,000, includes acquisition of data for main Hawaiian islands, ground truthing and geo-referencing of data, and final data product in priority reef areas for digital photo images, as well as data acquisition and geo-referencing of hyper-spectral imaging in priority reef areas.

Summary of priority projects proposed by Hawaii for USCRTF for FY2000-FY20005

	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
HIGH PRIORITY						
State of the Reefs Report	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Coral Reef Emergency Response Team	30,000		30,000		30,000	
Community-Based Management/Education and Monitoring	50,000	50,000	50,000	50,000	50,000	50,000
Marine Tourism Impacts Assessment	150,000	150,000	150,000	150,000	150,000	150,000
Enforcement Support a) Marine Resources Investigator b) Environmental Law Workshop	5,000	125,000	75,000	75,000	75,000	75,000
Linking Watersheds to Reefs Video		25,000				
Coral Reef Awareness Campaign	50,000					
Integrated Watershed Management			50,000	50,000	50,000	
MEDIUM PRIORITY						
Economic Valuation of Reefs		35,000				
Marine Debris Removal Coordination	60,000	60,000				
Marine Tourism Interpretive Training			150,000	60,000	60,000	60,000
Mapping of Main Hawaiian Islands	650,000					
TOTALS	$ 1,020,000	470,000	530,000	410,000	440,000	410,000

Puerto Rico Coral Reef Initiative: 1999-2004

Introduction

The Department of Natural and Environmental Resources (DNER) and the Puerto Rico Coral Reef Working Groups have developed the following five-year action plan for the Island of Puerto Rico. Numerous workshops held during the last five years by the U.S Islands Coral Reef Initiative, the Puerto Rico Coastal Zone Program, and the University of Puerto Rico Sea Grant Program have identified the components of this plan. These focus on gathering the necessary information required to support science, education, monitoring, management and enforcement needs. Confident that with a better understanding of our resources and accessibility to the information, agencies, researchers, and non-government organizations will work together in the achievement of our goals for the protection of coral reefs.

In the process of updating the 1997 Puerto Rico Coral Reef Action Plan, various steps were taken. DNER established a Coral Reef Working Group, which included participation of all the divisions and programs with some responsibilities for coral reefs. A two-day workshop was held with educators and NGO's from the entire island to develop an outreach and education strategy. Personal contacts were also made with other researchers and universities.

As previously stated, this plan maintains its objective of addressing the lack of information and its management. These have become key points in further developing a more detailed awareness, outreach, and enforcement plan. In the last two years, Puerto Rico has completed coral reef characterizations for Jobos Bay, Caja de Muerto, Guanica, Tourmaline, and Fajardo. Fifteen permanent transects have been established per site and a Coral Reef Technical Monitoring Workshop was held to enhance the establishment of a community and government based long-term monitoring program. At the same time, the Puerto Rico Coastal Zone Management Program has taken important steps in establishing an interagency Coral Reef Committee and compiling historic and new information regarding corals. A centralized data management program is being developed to facilitate the exchange and maintenance of information.

These achievements---the designation of the first Natural Reserve in Culebra that incorporates "No Take Zones," new and revised laws and regulations for the protection of coral reefs, fisheries, and related habitats, the approval of the Non-point Source Implementation Plan, the Mapping of Coral reefs in Puerto Rico, along with all the Island's NGO's outreach programs---are certainly important steps in taking action for the protections of our corals. The accomplishment of the activities in this plan will certainly be an important milestone in supporting the Governor of Puerto Rico's Initiative for the protection and stewardship of our resources.

A. Project: **Baseline Characterization**

Lead Agency: Department of Natural and Environmental Resources (DNER) and Private Consultants

Priority: High

Start Date: October 1998

Duration: Three years, 1998-2000

USCRTF Reference: Mapping and Information Synthesis

Information Gaps

- Inventory of Puerto Rican coral reefs (Cintrón and Goenaga, 1979) shows geographical distribution and provides qualitative descriptions of community structure (80 reefs), but not quantitative information from which to assess changes.
- Quantitative studies use different methodologies, include variable depths, are not recent, have incomplete characterizations of sessile-benthos (e.g., no algae, no abiotic), and few include fish surveys.
- Most recent quantitative studies (García and Castro, 1995-97) including sessile-benthos and reef fish characterizations are available for highly degraded sites (S.J. Bay, Guayanilla Bay, Mayagüez Bay), and few characterizations of our "best" coral reefs (La Parguera, Fajardo, Vieques, Culebra, Mona Is.)

Project Description

- Initial description of physical habitat: reef dimensions, depth range, distance from the coast, identify main coastal features (rivers, watershed uses) and potential sources of reef degradation (ports, domestic sewage, industrial/tourism activities).
- Qualitative description and photographic/video records at main reef physiographic zones (e.g., reef crest, slope, base of the reef).
- Quantitative assessment of reef community structure at each of the main physiographic zones. Follow CARICOMP protocol - determine percent linear cover by sessile-benthic biota with replicate permanent transects within narrow depth contours (5 transects/zones). Video transect documentation files.
- Quantitative assessment of reef fish and motile megabenthic invertebrate populations. Survey using belt transects centered on sessile-benthic permanent transects.
- Measurements of selected water quality parameters - turbidity, vertical/horizontal transparency, Secchi, temp/salinity, density, and fluorescence profiles, CTD
- 15 sites; 3 reefs per site; 2 depths per reef; 5 transects per depth. Add to existing database of 5 sites, 16 reefs.

Benefits

- Serves as the baseline for a long-term monitoring program, allowing for time-series analyses of reef community structure and vitality.
- Standardizes methodology to provide an intercomparable database from which to analyze spatial trends of coral reef community structure in relation to physical/environmental factors.
- Simplifies methodology which can be reproduced in monitoring programs by technicians and other non-specific personnel.
- Utilizes information as criteria for evaluations of prospective coastal developments (management decisions) and/or examine relationships between reef conditions and coastal developments (research).

Budget : $120,000 ($60,000/yr. FY 1999-00)

B. Project: **Training of Personnel**

Lead Agency: Department of Natural and Environmental Resources, Private Consultants

Priority: High

Duration: One Year

USCRTF Reference: Ecosystem Science and Monitoring

Project Description

- Technical workshop on coral reef characterization and monitoring. Capacitate personnel of the Marine Resources Division.
- Initial effort includes one workshop training for 4 people.
- Expand to include identification of disease and the collection of other physical and chemical parameters.

Benefits

- Agencies responsible for protection and management of coral reef resources will have personnel with expertise in reef characterization and monitoring techniques.
- Characterization and monitoring programs are not included as part of any specific course or workshop at agencies or universities. These employees will be able to capacitate other personnel in the DNER in CARICOMP techniques.

Budget: $13,000 FY 1999

C. Project: **Coral Reef Monitoring Program**

Lead Agency: Department of Natural and Environmental Resources; Marine Resources Division

Priority: High

Duration: Long-term, ongoing

USCRTF Reference: Ecosystem Science and Monitoring

Project Description

- Establish permanent monitoring stations of reef sessile-benthos, motile megabenthic invertebrates, reef fish population surveys and measurements of selected water quality parameters at representative coral reef sites including:
  a) marine reserves (Jobos Bay, La Parguera)
  b) impacted sites under restoration (Mayagüez Bay, Guayanilla Bay)
  c) low impact sites (Mona Is, Vieques, Culebra, Desecheo)
  d) highly impacted sites (San Juan Bay, Ponce Bay)
  e) sensitive sites to future coastal development (Boqueron, Guánica, Isabela, Arecibo, Rio Grande, Carolina, Vega Baja, Guayama).
- Use initial reef characterization as the baseline for monitoring program.
- Monitoring of permanent transects at least one time per year at each site.
- Continuous records of temperature and turbidity at eight high priority sites (JOBANERR, La Parguera, Cordillera Keys, Mona Island, Culebra, Mayagüez Bay, Boqueron, Guayanilla)

Benefits

- CARICOMP the only existing, partially implemented, long term reef monitoring program in Puerto Rico, is located in La Parguera and associated to the University of Puerto Rico.
- This monitoring program will allow the collection of comparable data of selected reefs in Puerto Rico for management and resource protection decisions.
- CARICOMP is widely used by other Caribbean Islands and Worldwide.

Budget: $85,000 FY 1999 ; $60,000 FY 2000-04
Includes salary for two positions, acquisition of scuba gear, video camera, turbidity meters, expendable termistors, and computer.

D. Project: **Data Management Center**

Lead Agency: Department of Natural and Environmental Resources, Puerto Rico Coastal Zone Program

Priority: High

Duration: Long-term, ongoing

USCRTF Reference: Ecosystem Science and Monitoring; Mapping and Information Synthesis

Project Description

- Establish a permanent Data Management Center for Coral Reef Studies at DNER that will receive, compile, and make available results from initial reef characterizations and long-term monitoring studies.
- Incorporate geographic Land Use (GPS, SSS, satellite images), climatological (NOAA), biological (reef characterization and monitoring) and sociological data into a Geographic Information System (GIS) for each site. Store information in CD-ROM.
- Compile historic data, coral reef related documents, and education materials.

Benefits

- Coral reef information and data will be available and accessible for the use of resource managers, researchers, educators, and general public.
- The Coastal Zone Program offer decision makers and general public information regarding coastal habitats.
- Data will be integrated to other available data GIS layers for Puerto Rico.

Budget: $40,000/ yr. FY 1999-2004
Includes the salary of a GIS person, Computer, and software.

E. Project: **Land Use GIS Layers**

Lead Agency: Department of Natural and Environmental Resources, University of Puerto Rico, other agencies or municipalities.

Priority: High

Duration: Two years

USCRTF Reference: Coastal Uses

Project Description

- Coastal development and land use have been identified as the primary stressors on coral reef ecosystems. Managers lack critical information that can help them regulate and evaluate status and trends of reef systems and the effects of management decisions.
- This project will develop a Land Use GIS layer of all municipalities for the selected coral reefs that will be monitored.
- The project is phased in two years. The first phase will develop GIS 1999 Land Use maps for the municipalities of Ponce (topographic quadrangles: Playa de Ponce, Ponce, Punta Cuchara, Peñuelas, Santa Isabel, Rio Descalabrado), Lajas (Parguera, San German), Vieques (Vieques), Culebra (Culebra), and Cabo Rojo (Cabo Rojo, Puerto Real).
- The second phase will develop Land Use maps for the municipalities of Guayanilla (Punta Verraco, Yauco), Mona Island (Isla de Mona), Isabela (Rincon, Aguadilla, Isabela), Arecibo (Camuy, Arecibo, Barceloneta) and Vega Baja (Manati, Vega Alta).
- Prof. Linda Vélez has done GIS Land Use mapping for the following municipalities through U.S. Forest Service and the University of Mayagüez: Guanica, Mayagüez, Carolina, Rio Grande, Canovanas, Luquillo, Fajardo, Ceiba, Naguabo, Juncos and Las Piedras. These can be added to our database upon interagency agreement.

Benefits

- USGS prepared a 1977 Land Use Map for Puerto Rico, but most of the Coastal development stressing coral reefs has developed in the last twenty years. These maps will bring Land Use data to the same time frame as the baseline characterization data, facilitating the evaluation of management decisions.
- GIS Land Use maps can be integrated into the baseline and monitoring data to create a tool useful for research, management, and educational objectives. These maps can serve as base maps to incorporate other available data such as: coral reef monitoring, water quality, weather, point discharges, new permits, ports & marinas, hydrology, roads & transportation, etc. providing a more complete tool to user groups and government agencies.
- This program objective is also compatible with the Puerto Rico Coastal Zone Program and federal watershed management focus.
- By the end of year 2002, the DNER will have updated GIS Land Use data for all coastal areas in Puerto Rico with the exception of six quadrants.

Budget: $ 120,000 FY 1999

F. Project: **Identification of "Hot Spots" and Installation of Coral Reef Signage**

Lead Agency: Department of Natural and Environmental Resources, Navigation Office, NGOs, Ranger's Corps, other Federal Agencies

Priority: High

Duration: Two years

USCRTF Reference: Coastal Uses

Project Description

- The DNER Ranger Corp is the main enforcement entity in Puerto Rico with responsibility for the implementation of Coral Reef laws and regulations. This enforcement entity required better tools to help them perform their task.
- Coral reefs are not properly identified in maps or with signs in highly used coastal areas were the majority of our reefs are located.
- A map will be developed in collaboration with an interagency committee and NGO groups to identify "Hot Spots" and other essential habitats for use of protection and surveillance by Rangers.
- Signs identifying reef areas and proper use information such as: recreational areas, anchoring buoys or areas, Jet Ski areas, diving areas, etc., will be developed and posted.
- High recreational use and boat traffic areas will be given priority in deploying the signs.

Benefits

- Provide better information tools for the DNER Ranger Corps and General Public that will facilitate the prevention and enforcement responsibilities.
- Create awareness regarding coral reef resources, their proper use and need for conservation.
- Reduce effects of human activities on coral reefs, such as anchoring and boat grounding.
- Enhance natural restoration of coral reefs and related habitats.

Budget: $40,000 FY 1999

G. Project: **Compile Sediment Run-off Data for Coral Reef Watersheds**

Lead Agency: University of Puerto Rico, Mayagüez Campus, Department of Natural and Environmental Resources (DNER), Jobos Bay Natural Estuarine Research Reserve (NERR), Graduate Students

Priority: High

Duration: Two years

USCRTF Reference: Water and Air Quality

Project Description

- One of the main causes for coral reef degradation in Puerto Rico has been identified as sedimentation caused by intense coastal land use and development.
- The Puerto Rico DNER is in the process of identifying and developing a cumulative impact protocol and/or model for evaluating cumulative impacts for Puerto Rico.
- Coral reefs and sea grass beds are very sensitive coastal habitats whose degradation is related to water quality. There is no data being collected that can provide regulatory agencies information on sediment rates due to coastal development is high demand areas. USGS only has sediment sampling stations on mayor rivers in Puerto Rico.
- This project will establish erosion and runoff plots (Edwards 1992) in identified vulnerable and "control" areas to ascertain the extent and composition of nutrient outlay from the field. A rainfall simulator (Miller et al., 1987), will be used to simulate different rainfall events, including a ten year, 24 hour rainfall event (> 8 inches in 24 hours, U.S. Department of Commerce, 1961).
- Water and sediment samples collected will be analyzed for sediment yield and elemental composition.
- Jobos Bay and Guanica will be used as pilots. Data collected will be utilized to validate cumulative impact model.

Benefits

- With this equipment sediment run-off data will be collected in all the mayor watersheds with coral reef ecosystems.
- This data will be added to the Geographic Information Systems (GIS) being developed for each of the watersheds where coral reefs are being monitored.
- This information will be valuable to regulatory agencies, permitting agencies, researchers and resource managers in addressing conservation, restoration and management strategies.

Budget: $30,000 FY 1999

H. Project: **Acquisition of Boats for Surveillance and Enforcement**

Lead Agency: Department of Natural and Environmental Resources, Ranger Corps Division

Priority: High

Duration: Two years

USCRTF Reference: Coastal Uses

Project Description

- As identified by the majority of the CRI working groups and NGO's, most of the regulation needed to protect coral reefs is in place, but there is lack of enforcement on the ground.
- Most Puerto Rico Ranger Maritime Units only have one boat to fulfill surveillance and enforcement duties along extensive coastal areas. Therefore priorities are selected based on theses limitations. Due to the increasing number of recreational boats and Jet Ski's on our coast, much of their effort is dedicated to enforcing navigation and safety regulations.
- Seven 25' Boston Whalers will be acquired to expand the Ranger's capacity to provide direct surveillance to coral reef areas. These seven boats will support the actual infrastructure of each of the seven ranger maritime units: Guayama, Ponce, Boqueron, Fajardo, Piñones, Aguadilla, Arecibo.
- Seven boats will be purchased on a two-year timeframe basis.

Benefits

- All seven Ranger Units will have greater capabilities to expand their surveillance and enforcement activities to include coral reef areas. This action will result in having more ranger presence on the reefs to enforce existing regulations.
- While patrolling coral reefs, they can deliver education materials to reef users broadening their outreach efforts.

Budget: $600,000 ($300,000/ yr. FY 1999-2000)

I. Project: **Coral Reefs and Related Systems General Public Education Program**

Lead Agency: Department of Natural and Environmental Resources, Private and State Universities, Sea Grant, Non-profit Organizations

Priority: High

Duration: Three years

USCRTF Reference: Education

Project Description

It is necessary to gather and evaluate the existing written information related to coral reefs and associated marine systems, since most of it has not been updated. There is a gap on the aspects of coral reefs systems that have been documented or disseminated. In addition, the information has not been classified by levels or stakeholders. We propose to incorporate the gathered information in the proposed data bank that satisfies the needs of the stakeholders. The following activities will be completed:

- Active gathering of all kind of information related to coral reefs and related systems.
- Use of media to stimulate producers of information on coral reefs and related systems to cooperate in the creation of the data bank.
- Creation of several information centers.
- Creation of an Internet Page
- Continuous updating of information bank.

Benefits

Puerto Rico will have updated, reliable, accessible and available information for multiple uses.

Budget: $20,000.00 ($10,000.00/year)
$28,400/yr (It is a requirement to recruit an environmental educator that will be working with the DNER during the first two years of the work plan coordinating of the proposed educational.)

J. Project: **Dissemination of Information**

Lead Agency: Department of Natural and Environmental Resources, Sea Grant

Priority: High

Duration: Ongoing

USCRTF Reference: Education

Project Description

DNER's experience in educational activities has reflected that our citizens are eager to know about our natural systems, not only to satisfy school requirements, but also because of their interest in environmental themes, particularly in coral reefs and related resources. Written information at various educational levels is continuously requested and occasionally we are not able to satisfy the demand since there is no information available.

To satisfy our citizens' request on environmental themes at various levels, particularly on coral reefs and related systems, the following activities are proposed:

- Preparation of educational material
- Preparation of a glossary
- Reproduction of information
- Distribution of information in places of tourist interest
- Utilization of the fishing and navigation license issuing process to disseminate information
- Distribution of information in the country's educational centers

Benefits

Puerto Rico will have a permanent and available wealth of information.

Budget: $ 40,000.00 (10,000.00 /year)

K. Project: **Teacher and Student Training**

Lead Agency: Department of Natural and Environmental Resources, Department of Education, Sea Grant, Superior Education Council

Priority: High

Duration: Three years

USCRTF Reference: Education

Project Description

Puerto Rico does not have a formal obligatory education curriculum that responds to the need of transferring information about the condition and characteristics of marine resources, particularly coral reefs and related systems. This project proposes to:

- The incorporation of Puerto Rico' s coral reefs and related systems in the formal teachers' guide.
- To promote as a requirement a coastal environmental course in the Faculty of Education and in the educational curriculum of the Department of Education.
- To establish a committee to prepare a teacher's guide to incorporate a course on coral reefs and related systems into courses of elementary, junior high, and high school level.
- To design a marine biology course at high school level.
- To train teachers through guide.

Benefits

That education college students, teachers and students of the three educational levels (elementary, junior high, and high school) have the formal and systematic opportunity of learning about coral reefs and related systems.

Budget: $15,000.00 ($5,000/yr)

L. Project: **Coral Reefs and Marine Related Systems Laws and Regulations Education Guide**

Lead Agency: Department of Natural and Environmental Resources

Priority: Medium to High

Duration: One Year

USCRTF Reference: Education

Project Description

It is important that groups of interest which can potentially impact coral reefs have knowledge about the related laws and regulations to obtain a better enforcement of these provisions and, therefore, less degradation on these resources. The following objectives are:

- To educate groups of interest which can potentially impact coral reefs on related laws and regulations in order to prevent further damage to these systems.
- To contact agencies concerned with the management and use of the resource and which administer laws and regulations related to this resource.
- To prepare a document incorporating information on related laws and regulations.
- To distribute the document among groups of interest identified through interagency workshops and seminars.

Benefits

Negative impact on natural resources and associated systems will be reduced.

Budget: $10,000.00 FY 1999

Summary of Puerto Rico's Coral Reef Activities

Coastal Uses

- Land use GIS Layers…… $ 120,000 FY 1999
- Identification of " Hot Spots" and Installation of Coral Reef Signage……...…$40,000 FY 1999
- Acquisition of Boats for Surveillance and Enforcement ……...$600,000 ($300,000/ yr. FY 1999-2000)

Ecosystem Science and Monitoring

- Training of Personnel ……..$13,000 FY 1999
- Coral reef Monitoring Program ……..$85,000 FY 1999 ; $60,000 FY 2000-04
- Data Management Center ……$40,000/ yr. FY 1999-2004

Mapping and Information Synthesis

- Baseline Characterization …..……..$120,000 ($60,000/yr. FY 1999-00)
- Data Management Center ……$40,000/ yr. FY 1999-2004

Water and Air Quality

- Compile Sediment Run-off Data for Coral Reef Watersheds …….$30,000 FY 1999

Education

- Coral Reef's and Related Systems General Public Education and Awareness Program ……..$20,000.00 ($10,000.00/year); $28,400/yr
- Dissemination of Information ……$ 40,000.00 (10,000.00 /year)
- Teacher and Student Training ……$15,000.00 ($5,000/yr)
- Coral Reef and Marine related Systems Laws and Regulations Education Guide ……..$10,000.00 FY 1999

US Virgin Islands Coral Reef Initiative 1999-2004

Background

The US Virgin Islands are located about 1,400 miles south-southeast of Florida, at 65 degrees west longitude and 18.3 degrees north latitude. St. Croix, St. John, and St. Thomas are the three largest islands. However, there are many offshore cays that dot the waters surrounding the three main islands.

The Virgin Islands' climate is temperate, with temperatures ranging from approximately 78 degrees Fahrenheit to 94 degrees Fahrenheit. The surrounding waters remain almost constant year round with temperatures ranging from 75 degrees Fahrenheit in the winter months to 85 degrees Fahrenheit during the summer months.

The topography of St. Thomas and St. John primarily consists of steep mountains which form lush, vegetated valleys that slope gently to the shoreline. St. Croix is not as mountainous as the other two islands, but run-off does reach the shoreline during high rainfall events.

The shoreline of each island is characterized by deep indentations that form bays. Cobblestones line some shorelines, while white sandy beaches or mangrove forests line others. In other places, the land ends abruptly at steep shoreline cliffs. Many bays have ponds located just landward of the shoreline. These ponds act as sediment traps, filtering sediment-laden runoff before it reaches the ocean. In addition, these ponds provide important breeding habitats and feeding grounds for many different species such as waterfowl, wading birds, and crabs.

Magnificent coral formations can be found in the waters surrounding the Virgin Islands (VI). The warm constant water temperature and remarkable clarity provide ideal conditions for coral reef growth. Coral reefs can be found extending out from the jagged cliffs and along the shorelines of the islands and surrounding cays. The cliffs form rocky outcrops on the ocean bottom, thus providing the solid surface to which corals must attach. The coral reefs in the Virgin Islands are shallow fringing reefs that parallel the coastlines. Many of them have been established on a framework of coral skeletons that has taken thousands of years to develop. Some of the VI coral reefs are found many miles from land where the ocean floor rises close to the surface.

The Virgin Islands' coral reefs are, as elsewhere, very fragile. The coral reefs' health depends upon a delicate natural balance. They must have bright sunlight, stable salinity, and a water temperature that stays between 70 to 85 degrees in order to thrive. Clear

water, couples with a relatively shallow depth and plenty of sunlight allow the symbiotic algae within the coral polyps to photosynthesize and produce nutrients needed by both organisms. Gentle wave action is also needed to remove the sediment from coral reefs that would otherwise suffocate and smother them. Wave action also brings a steady supply of planktonic organisms on which the coral polyps feed.

Statement of the Problem

The Virgin Islands' coral reef ecosystems are under heavy pressures. Hurricanes and other major storms, higher than normal wave and water temperatures, and diseases that have affected the coral reefs and their inhabitants have combined with destructive boat anchoring practices, boat groundings and cargo spills, careless land usage, improper dredging practices, and over-fishing to cause dramatic deterioration of the Virgin Islands' coral reefs. Within the last 15 to 20 years, the amount of live coral has declined dramatically, while the abundance of algal life forms has increased proportionately. The increase in algae most likely reflects the increase in available substrate due to coral polyp death and an inability of herbivorous fish and sea urchins to maintain control of algal growth.

Since controlling the destructive forces of nature is beyond our capabilities, we must focus our attention on correcting those human practices which have negative impacts upon our coral reefs and other ocean resources. Following are some of the human activities that require our attention.

Diving and Snorkeling – The Virgin Islands' beaches and coral reefs attract over one million visitors annually. This is in addition to the many residents who utilize these resources for many different reasons. Numerous visitors snorkel or scuba dive over the reefs to view the vast variety of marine species that they support. While no studies have documented exactly how an increase in the number of snorkelers and scuba divers at a reef results in increased reef damage, we do know that breakage occurs when the coral is stood upon, hit by flippers, or otherwise touched.

Even though coral reefs appear to be hard, like rock, they are really very fragile. Touching or stepping on the coral kills the fragile coral polyps. While some of this damage is intentionally done by souvenir seekers breaking off pieces to take home, much of the damage appears to be accidental. Apparently many first-time snorkelers do not know or understand the delicate and fragile nature of coral reefs and how long it takes one to grow and develop.

Anchor Damage – Closely related to the type of destruction caused by swimmers is anchor damage. This is caused by boaters carelessly dropping anchors on coral reefs and in sea grass beds. The number of boats utilizing the Virgin Islands waters has increased tremendously over the past ten to fifteen years. Many of these vessels are bareboat charters, which are crewed or captained by visitors unfamiliar with the territorial waters. Consequently, anchors are dropped on coral reefs, causing breakage and death to the coral polyps. Within the past seven years, the Virgin Islands Park Service officials began diving on sites as mid-size to large vessels drop anchors. In one 1987 case a mini-cruise

ship, "Windspirit," inadvertently dropped anchor on a coral reef. The Virgin Islands National Park successfully prosecuted the case and received an award of monetary damages from the cruiseline.

Boating – Within the past ten years, the National Park Service has begun documenting cases of boat grounding. Much of this information has been received from people witnessing such groundings, and from cases where a vessel has become disabled and cannot free itself. This is also primarily caused by bareboat charterers who are unfamiliar with the territorial waters.

Overfishing – Another cause of reef degradation is a decrease in the reef fish population. This is a growing concern among marine scientists. Overfishing is thought to be the cause of this decrease. Some Virgin Islands' fishermen make their living from fishing, while others simply fish for recreation. Overfishing is possibly the result of commercial fishermen increasing bag limits to keep pace with the Virgin Islands' rising cost-of-living. Currently, it is one of the more expensive jurisdictions in the US.

The National Park Service conducted a study on the effects of trap fishing on fish assemblages within the Virgin Islands National Park and Buck Islands Reef National Monument. Using historical information and experimental trapping, the report concluded that commercial and sustenance fishing (primarily trap fishing) is responsible for fish population declines (Beets 1996).

The issue of overfishing has potential political ramifications, and therefore, may not have any easy answers. One possible solution, increased regulations, may be unpopular among politicians due to possible sociological and economic ramifications.

Waste Disposal – Because of its magnificent coral reefs and crystal clear blue waters, the Virgin Islands has a large marine industry. One facet of this industry, the charter boat business, attracts a large number of people. Many of these charter boat owners live aboard their vessels. However, only three marina pump-out stations exist in the Virgin Islands to accommodate the large number of vessels utilizing the territorial waters. The many marine industry support personnel, who find it less expensive to live aboard vessels that they own, compound the problem of waste disposal. While many of the boats are equipped with holding tanks, the current law requires that a boast be three miles offshore prior to having its tanks pumped out. It is safe to assume this law is not universally followed. Consequently, much sewage is pumped directly into the bays surrounding the islands. This has increased the nutrient levels of the nearshore waters and has had a negative impact on the fragile balance of the marine ecosystem.

Sedimentation – Currently, the major stress placed upon the Virgin Islands' coral reefs is the result of terrigenous runoff due to deforestation for upland construction. Siltation, caused by soil eroded by excessive runoff, has the following deleterious impacts on coral reefs: (a) increased levels of turbidity reduce sunlight penetration, thus interfering with photosynthesis; (b) sediment covered surfaces which are too soft and unstable for coral and invertebrate larvae to colonize, thus reducing reproduction rates; and (c) sediment

physically settling on the coral polyps, thereby interfering with a polyp's ability to capture food and other nutrients, thus leading to death.

Rapid population growth in the Virgin Islands has had a detrimental effect on the coastline and nearshore areas. The increased population growth has led to an increase in housing needs and infrastructure development. The general practice of clearing land for housing has been to remove all the vegetation from the site. There have also been many roads and driveways that have been poorly designed and constructed. The negative environmental impact from these activities is magnified by the islands steep topography. These practices and topography result in sediment-laden runoff entering the bays during periods of medium and heavy rainfall. This is obvious as large plumes of brown are seen entering the water in most bays and harbors after such rainfall events.

A theoretical study of sediment runoff indicated that reef distribution around St. John is a function of watershed size, bay exposure, and bathymetry, distance from sources of land-derived sediments and storms (Hubbard 1997). Current development of private land and construction of new and unpaved roads have increased the flow of sediment into nearshore waters (Anderson 1994).

For many years scientists have monitored the growth of coral reefs in various locations around the Virgin Islands. Their efforts have detected the negative impacts the problems stated above have had on coral reef health. The Department of Planning and Natural Resources, through its Division of Fish and Wildlife, and the National Park Service are two agencies collecting data through ongoing reef monitoring.

It appears that coral reefs are adequately protected under existing Virgin Islands' environmental statutes. Most of these are broader in scope than just reef protection, but some are aimed directly at the coral reef environment. However, the primary reason for the destruction of coral refs is due to the lack of the public understanding of the importance of coral reefs to our environmental and economic well-being. Coral reefs have historically been damaged from improper boating practices, snorkelers, scuba divers, and shoreline development.

The project proposals have been designed to help managers gain a better understanding of the scientific conditions of coral reefs and to address the public awareness issues that are key to improving overall coral reef management in the US Virgin Islands.

A. Project: **Coral Reef Program Coordinator**

Lead Agency: Department of Planning and Natural Resources

Priority: High

Start Date: FY 00

Duration: Ongoing

USCRTF Reference: Information Synthesis

Project Description

One scientist (Ph.D. level) will be hired to facilitate and organize the various projects that relate to coral reef management. This person would have experience in both the scientific and administrative areas so that they can be tasked with one or more of the projects while being able to administer the overall program.

Benefits

By selecting a lead person to coordinate the coral reef work, there will be a central venue for dealing with inquiries and for information dissemination about coral reefs. The Coordinator will also be able to minimize the possibility of duplicative efforts by coordinating ongoing work in the territory and ongoing work in other islands and states.

Budget Estimate: $65,000.00 per year for salary, benefits and travel, $15,000.00 first year for office setup.

B. Project: **Develop Coral Reef Curriculum for Schools**

Lead Agency: Department of Planning and Natural Resources & Department of Education

Priority: High

Start Date: FY 00

Duration: 18 months

USCRTF Reference: Education

Project Description

Through coordination with the Department of Education, the development of a program of approximately one week in length for use in grade or high school science classes will be undertaken. This will be based upon the EPA Coral Reef book, and the films and videos which the Coastal Zone Management Program (Program) currently has. Segments of the week-long program would focus not just on a coral reef's biology and the surrounding ecosystem, but also on the effects of different types of pollution, watershed management, safe boating practices, and practical ways in which individuals can help protect and improve the Virgin Islands' coral reefs and related ecosystems. The Division will provide training workshops on the marine environment for teachers. Training will consist of two workshops, one on St. Croix, the other on St. Thomas. If successfully implemented, the Division will consider yearly or every other year workshops which will incorporate new information discovered since the last workshop.

Benefits

By introducing the importance of coral reefs to children, the information would be passed on to parents and a general shift in attitude and behavior towards the protection of coral reefs could be expected.

Budget Estimate: $30,000.00 for the first year for consultants, workshops, inter-island travel and copy & distribution of educational material. $5,000.00 per year for updates thereafter.

C. Project: **Develop Mobile Information Exhibit**

Lead Agency: Department of Planning and Natural Resources

Priority: High

Start Date: FY 00

Duration: One Year

USCRTF Reference: Education

Description

This project will involve developing a mobile information exhibit that can used during Earth Day exhibitions, Coast Weeks, and at other times to distribute information to the public. Interactive exhibits will be used to show how pollution and environmental degradation in the USVI ultimately ends up negatively affecting the surrounding coral reefs. There will also be more traditional methods of dissemination information available, such as pamphlets and bumper stickers. Personnel staffing the exhibit will be able to meet people face to face, thus humanizing the messages to not pollute, pick up trash, and the need to clean up beaches and roads.

Benefits

The public will be informed as much as possible throughout the year about the need to conserve remaining reefs. The Division will be focusing educating the public and building grassroots support for achieving the goal of preserving the Virgin Islands' remaining coral reefs and related ecosystems.

Budget Estimate: $10,000.00

D. Project: **Outreach to the Business Community**

Lead Agency: Department of Planning and Natural Resources

Priority: High

Start Date: FY 01

Duration: One Year

USCRTF Reference: Education

Project Description

Produce a program to present to Chamber of Commerce meetings and other clubs, religious, or civic meetings or groups. Statistics will be obtained from the Virgin Islands Department of Tourism on how much money tourists spend in the VI and where the money is spent. Considering that a large number of tourists visit the Virgin Islands because of the beaches, snorkeling, and diving opportunities, the Division will then correlate the spending patterns to show how healthy reefs benefit our economy.

Benefits

By documenting the economic value of coral reefs, the business sector would be more apt to promote and sponsor efforts which will help to protect a valuable resource to the economy.

Budget Estimate: $18,000.00

E. Project: **Baseline Information and Research**

Lead Agency: Department of Planning and Natural Resources

Priority: High

Start Date: FY 99

Duration: 3 Years

USCRTF Reference: Mapping and Information Synthesis

Project Description

This project has commenced with over-flights by NOAA to map the near-shore coral reefs around the major Virgin Islands. Completion of this project will result in digitization of all near-shore reefs and overlays of adjacent land-based development to include population density.

Benefits

This information would be used in conjunction with the Divisions' GIS program to guide development into areas that would result in minimal impact to coastal resources. Where unavoidable, development in environmentally sensitive watersheds could be more rigorously managed and mitigated to minimize adverse impacts.

Budget Estimate: $350,000.00 which includes acquisition of data, classification scheme development and training for efficient use of acquired data.

F. Project: **Enforcement**

Lead Agency: Department of Planning and Natural Resources

Priority: High

Start Date: FY 00

Duration: One Year/Ongoing

USCRTF Reference: Coastal Uses

Description

This project will provide the hiring, training and equipment for at least four environmental officers involved in marine law. Training will be provided to educate the officers about the laws which protect coral reefs specifically and other laws related to coastal resource protection, generally. the officers will be provided with equipment and supplies that would allow them to survey the territorial waters to ensure compliance with these laws in a professional manner.

Benefits

The presence of officers ready to enforce marine laws for the protection of resources in itself would serve as a hindrance to violations. The officers, in their enforcement role will also educate users by providing pamphlets and other educational material about the marine laws which they enforce and other pertinent information.

Budget Estimate: $120,000.00 for the purchase of equipment, supplies, and training for four environmental officers ($60,000.00 for each district). $75,000.00 each additional year thereafter.

G. Project: **Monitoring**

Lead Agency: Department of Planning and Natural Resources & University of the Virgin Islands

Priority: High

Start Date: FY 00

Duration: Ongoing

USCRTF Reference: Water and Air Quality

Description

This project will involve monitoring of coral reefs that are not currently part of an existing monitoring program. Monitoring will be associated with reef fish population surveys and measurements of selected water quality parameters. Training will be provided for staff from the Department of Planning and Natural Resources along with staff from the University of the Virgin Islands in the methodological and technical approaches to monitor reef. Because of the proximity to Puerto Rico, monitoring strategies will be collaborated with scientists from the University of Puerto Rico to ensure usability and compatibility of data collected.

Benefits

The availability of baseline data is critical to any long-term restoration or preservation effort. As the Clean Water Action Plan moves toward implementation of the watershed restoration strategy, this data will help to evaluate the effectiveness of best management practices (BMP's) on water quality and ultimately on coral reefs.

Budget Estimate: $90,000.00 includes salary for one new position, funding for the purchase of necessary equipment and supplies, and travel between the islands and Puerto Rico. $75,000.00 per year thereafter.

H. Project: **Comprehensive Assessment of Virgin Islands Marine Resources**

Lead Agency: The University of the Virgin Islands

Priority: Medium

Start Date: FY 00

Duration: 3 Years

USCRTF Reference: Information Synthesis

Description

The US Virgin Islands marine resources include coral reefs, seagrass beds and mangrove lagoons along the shoreline of the three main Virgin Islands. Although these habitats act as important nursery areas for commercially valuable species such as snappers, lobster, and conch, they are currently being impacted by human activities including shoreline development, sedimentation, and pollution. In addition to these near-shore habitats, the Virgin Islands are surrounded by isolated coral reefs on the mid-shelf and shelf edge regions of the Virgin Islands plateau. These extensive, yet poorly known, coral reefs function as important spawning aggregation sites for a variety of grouper and snapper species. Together, these three major reef systems provide the essential habitats for sustaining our renewable marine resources. It is essential that management agencies understand the linkages between coastal marine habitats and the fish populations that rely on these habitats as nursery grounds and breeding sites.

This project will provide baseline data essential for evaluating the effectiveness of future management actions. Since many reef fish species utilize all of these habitats throughout various stages of their life cycle, understanding the linkages is necessary for informed management decisions.

Benefits

This project will provide baseline data essential for evaluating the effectiveness of future management actions. Since many reef fish species utilize all of these habitats throughout various stages of their life cycle, understanding the linkages is necessary for informed management decisions.

Budget Estimate: $100,000.00 for salary for two positions and for the purchase of necessary equipment and travel, $80,000.00 per year thereafter.

I. Project: **State of the Reefs Report**

Lead Agency: Department of Planning and Natural Resources and the University of the Virgin Islands

Priority: High

Start Date: FY 00

Duration: Ongoing

USCRTF Reference: Information Synthesis

Project Description

Produce a printed document and a link to The Virgin Islands Coastal Zone Management Program homepage that describes the status of the Virgin Islands' reefs annually. The document will include status reports of ongoing projects and identify areas for future research needs.

Benefits

Will provide concise up-to-date information about reefs in the VI that would be useful to policy makers, scientists and others. The information will assist those at the decision making level to plan for the future based on current information.

Budget Estimate: $15,000.00 which includes costs for layout, design, printing and distribution of the report as well as the costs for linking this information to the VICZM homepage.

Summary Sheet

A. Project: **Coral Reef Program Coordinator**...……..……$ 80,000.00

B. Project: **Develop Coral Reef Curriculum for Schools**...…….35,000.00

C. Project: **Develop Mobile Information Exhibit**...……10,000.00

D. Project: **Outreach to the Business Community**...……18,000.00

E. Project: **Baseline Information and Research**...……..350,000.00

F. Project: **Enforcement**...…….120,000.00

G. Project: **Monitoring**...…….165,000.00

H. Project: **Comprehensive Assessment of Virgin Islands Marine Resources**...……180,000.00

I. Project: **State of the Reefs Report**...……..$15,000.00

BUDGET TOTAL……$973,000.00

Partnership Opportunities

In the course of determining the priorities of each island jurisdiction with its local working groups and sharing this information with the coordinating committee, USAICRICC recognized several projects which could be mutually beneficial. After the long history of cooperation among the islands, it made sense to identify partnership opportunities in addition to the long-term planning for the coral reef initiative.

Each island has prioritized the projects needed to improve coral reef management in its jurisdiction. These take precedence because they address the immediate, local situations. The cooperative activities, however, will assist with some of these activities and will enable resources, such as staff and funding, to be spread further.

These opportunities do require funding and resources. Besides the funding available for the coral reef initiative, additional funds and partnerships will be sought from federal grant programs, non-governmental organizations, private and commercial businesses, and foundations. With limited funds available for resource management, these opportunities will enable the islands to fully share resources, such as technical expertise, information, and materials.

Partnership Opportunities

Opportunity:	**Regional and International Coordination and Information Exchange**
Lead Agency:	Department of the Interior/NOAA
Duration:	Two Years
USCRTF Reference:	Education/Awareness, International

Project Description

The United States Coral Reef Initiative supports the principle of cooperative assistance, coordinating and training between partners at every level, from local to regional, and from regional to the national and international arenas. On the regional level, defining the U.S. flag islands as a region, this principle has been manifested in the 1994 Pacific Basin U.S. Coral Reef Workshop which led to development and adoption of the U.S. Pacific Islands Coral Reef Work Plan, and evolved to allow development and adoption in 1997 of the United States All Islands Coral Reef Strategy. This coral reef strategy was part of the basis for the Presidential Executive Order on Coral Reef Protection in 1998.

Regional and International Coordination and Assistance

Regional and international organizations throughout the Pacific and Caribbean, make available meetings, conferences, workshops and training courses related to coral reefs and reef ecosystems. Often, representatives from the U.S. flag islands are invited to share their experiences or to learn from their island neighbors and countries. Unfortunately, those opportunities are more often than not missed due to a lack of travel and per diem funds, although the U.S. islands are otherwise eligible and are encouraged to participate. Because of the information and experience sharing available at these events, the ability to participate would greatly enhance the U.S. islands abilities to better manage and preserve U.S. reefs.

Additionally, the U.S. flag islands of Guam, Puerto Rico, Commonwealth of the Northern Mariana Islands, U.S. Virgin Islands, American Samoa, and Hawaii have considerable expertise in coral management and science. The U.S. islands already work both formally and informally (through joint efforts with federal partners, through local university exchanges, or other avenues) with independent island nations throughout the respective regions. The U.S. islands can assist the federal partnership through active assistance to neighboring, but independent islands. For Guam and CNMI this could mean collaborations and cooperative efforts with Federated States of Micronesia, Republic of Palau, and Republic of the Marshall Islands. For American Samoa, activities and information sharing with South Pacific island nations such as Western Samoa, Fiji, Tonga and others is possible. For Puerto Rico and U.S. Virgin Islands, efforts with the

geographically associated island nations of the Caribbean would create benefits. Again, while cooperative channels now exist, the success of cooperative efforts is hampered by a lack of travel and per diem funding.

Finally, the benefits of meetings between the U.S. flag islands have already been realized in island efforts in crafting the language of the U.S. Coral Reef Initiative, and in the products of the Pacific Islands Coral Reef Work Plan and 1997 All Islands Coral Reef Strategy. These efforts were only possible, however, because island representatives were afforded the opportunity to meet together. Insufficient funds exist to continue necessary meetings for the advancement of U.S. island coral reef cooperative efforts.

This task proposes to develop a fund for travel and per diem, to be shared on an equal, non-competitive basis by the U.S. flag islands, to accomplish the travel necessary to take advantage of island expertise in developing regional, national, and international management and protection regimes. An effective mechanism for dispersal of funds would be through the utilization of a non-profit organization with working knowledge of the U.S. islands and their needs, such as Pacific Basin Development Council or Coastal States Organization. Designated Coral Reef Points of Contact on the U.S. All Island Coral Reef Initiative Committee would be responsible for approving use of the funds and for reporting on the use.

Budget Estimate: $180,000 in year one
$180,000 in year two

Project Name:	**Coral Reef Education and Outreach Campaign**
Lead Agency:	Island Points of Contact, appropriate federal agencies and private sector businesses (specifically the media and travel business sectors).
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses, Ecosystem Science and Conservation, and Water and Air Quality Working Groups
Start:	YF2000-FY2002
Duration:	Ongoing

Project Description

Create a region-wide, multi-year public awareness campaign focused on the special attributes of coral reef resources and what needs to be done to protect them. Through a multi-year initiative, the goal is to convince the public and policy makers that by conserving our coral reef resources, we will also protect our economies, lifestyles and cultures. Like AdCoucil campaigns, we will utilize communications, public relations, marketing, video productions, and advertising, to develop and market a media campaign that will move the public to action and help protect our reef resources. Like the messages, the target audiences will vary, depending on the goal of the individual island campaigns and selected methods. Methods would vary and overlap, perhaps reaching multiple audiences simultaneously. Existing material from each of the islands and the federal government would be incorporated into the campaign to link messages and programs and ensure consistency where possible. Topics and messages will be developed to meet the needs of the individual island areas, as well as the region.

Audiences will include:

- Decision-makers and opinion leaders
- Private sector (tour/travel operations)
- Residents and visitors
- Educators and students
- Recent immigrant communities
- Military
- Visiting commercial fishing vessels

Possible topics include:

- Coral reef etiquette do's and don'ts (*For tourists and training organizations*).

- Basic coral reef ecology, what's so special about a reef and what are the benefits - direct (e.g. shoreline protection) and potential (pharmaceutical products)? This segment would also include: How do you tell if a coral is alive or dead? What does unhealthy coral look like vs. healthy coral, etc.? (*For training agencies and school groups*).

- What happens if there are no more coral reefs in most of the world? (*For policy makers and general public*).

- Fascinating fish facts and cool coral critters. (*For everyone*).

- Linking watersheds to coral reefs (*For everyone*).

Benefits of Project

An informed community will better understand the need for conservation of coral reef resources and will demonstrate their support for conservation efforts. The goal is to develop a strong constituency to support coral reef protection efforts to ensure that projects and programs initiated by the coral reef initiative are long lasting and effective.

Budget: $200,000/year

Project:	**Economic Value and Contributions of Coral Reefs**
Lead Agency:	Federal: NOAA, NFMS & Sanctuaries Program, Department of Interior (DOI), US Fish & Wildlife Service (USFWS), National Parks Service (NPS); Local - Department of Commerce or Business, Coastal Resource and Fisheries Management Programs, universities/colleges, and other agencies as appropriate
Priority:	High
USCRTF Cross-reference:	Coastal Uses Working Group
Approximate year of start:	2000
Duration:	4 years

Introduction

The vision statement of the US All Islands' Coral Reef Initiative Committee states:

> The long-term sustainable use of coral reef ecosystems and the perpetuation of their economic, cultural, and environmental values are vital to our way of life and will be the guiding principles on our islands.

The cultural and environmental values of coral reefs are well-known and coastal managers and decision-makers factor in these values when planning and managing growth. Conversely, the *economic* value of coral reefs is less well known and typically has not contributed to the decision-making process in the islands.

Various federal and state rules and regulations, including the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the Oil Pollution Act of 1990, encourage or require the environmental valuation of areas that have been affected by a negligent act (Lipton et. al., 1995). Economists have developed a series of techniques to assess the economic value of many market and non-market environmental resources. The economic value of fisheries and wetlands, for example, are better understood. Fewer economic analyses have been conducted on coral reefs, in part because most reefs are outside of the 48 contiguous states of the US, fewer development pressures have been placed on them, and because they are more complex environments than other ecosystems. However, the health of the coral reefs is declining and managers are increasingly being pressured to permit activities in their jurisdictions that may harm coral reefs. Time is of the essence to conduct a thorough economic valuation of coral reefs in island jurisdictions. It will provide a valuable tool to coastal managers that will enable them to plan and manage growth in a way that ensures sustainable use of coral reefs.

With ship groundings a common occurrence in several island jurisdictions, the ability to assess damages based on an economic value will assist in coral reef restoration efforts. Other anthropogenic effects, such as oil or chemical spills, may also be analyzed for damages incurred. A current court decision from a ship-grounding incident in the Florida Keys assessed the value of reef resources at $2,833 per square meter for those reefs lost due to the grounding. This value is felt to be low when compared to the additional biological values (e.g. biodiversity, endemism) and economic values (e.g. shoreline protection, beach generation) that coral reefs have in island ecosystems. Further research needs to be done to establish similar values for island reef resources.

This proposal seeks funding to prepare an economic valuation of coral reefs for managers and scientists in the US islands. This new tool will improve the decision-making process and provide island resource managers with information to ensure the sustainable use of coral reef resources.

Project Description

This purpose of this project is to determine the economic value and contribution of US coral reefs to the economies of the US islands. The US All Islands Coral Reef Initiative Committee (USAICRIC) proposes a three-part study with the goal of providing island jurisdictions tools that will allow them to make appropriate decisions to ensure the sustainable use of coral reef resources. The primary components of this project are:

- **Economic valuation** -- Analysis of island economies and valuation of the contribution of reef resources to each jurisdiction.
- **Coral Reef Damage Assessment Workshops** -- Train scientists and managers of each jurisdiction to conduct legally binding consistent coral reef damage assessments.
- **Feasibility Study for Legislation** -- The study would look at the costs and benefits of proposing legislation for each jurisdiction to establish a trust fund for damages collected from injuries to coral reef resources.

Economic valuation

Based on the extent of coral reef resources in each island jurisdiction, the economic value and contribution of the reefs to the island economies and the nation should be assessed. This will be a two-part component of the project, the first of which is an analysis of island economies, where needed. The second part will consist of a valuation of the contribution of reef resources to each jurisdiction. Both the market and non-market value of coral reefs will be determined.

Island economies are very different from US mainland economies. Marine-based tourism is the backbone of most US islands, but the residents also depend upon healthy coral reefs for food, storm protection, and emerging uses, such as pharmaceutical production. The island economies are also much more affected by global economic changes than are mainland economies. For example, the CNMI economy almost collapsed with the recent downturn in the Asian economies. Simple economic models that include both direct and

indirect expenditures, the value of subsistence fishing, gathering, and agriculture, land tenure impacts, multiplier effects, and both short and long term economic projections need to be developed.

The valuation of the contribution of reef resources to each US Island jurisdiction may be more difficult than it would be for mainland states. In many cases, western economic values are relatively new to the islands and often the islands either directly or indirectly employ certain aspects of traditional land tenure and communal property values. For the islands, the value of the cultural use of reef resources probably far exceeds the market value of the resources. Thus, a team of economists, anthropologists, and coral reef ecologists should be employed to conduct the economic valuation.

The values of coral reefs include, but are not limited to, (from Spurgeon, 1992):

- Direct Use Values -- Extractive
  - Fisheries, aquarium, and curio trades
  - Pharmaceutical and other industrial uses
  - Construction
- Direct Use Values
  - Non-extractive
  - Tourism
  - Recreation
  - Research
  - Education
  - Social value
- Indirect Use Values
  - Biological support
  - Rates of endemism
  - Shoreline generation and protection
  - Global life support
- Social services
- Non-Use Values
  - Existence values
  - Option values
  - Intrinsic value
- Costs of reef

Coral Reef Damage Assessment Workshops

A large portion of the continental US coral reefs fall under federal jurisdiction, because they are located in marine sanctuaries. This designation gives resource managers direct and quick access to federal assistance to conduct natural resource damage assessments. Most of the culturally and economically valuable coral reefs of the US islands, however, are under local control. Therefore, local jurisdictions are responsible for conducting natural resource damage assessments and attempting to recover damages. Many of the island jurisdictions lack the resources to hire experts and outside counsel, and therefore, the cases are often disregarded (Mattson et. al, 1985).

The third component of this project is to conduct workshops for scientists and managers of each jurisdiction to develop a consistent coral reef damage assessment methodology that will be upheld in court. Because coral reefs are such complex ecosystems, apparently insignificant immediate damages may have significant long-term secondary effects on community structure (Hatcher, 1984). Scientifically defensible and widely accepted methods must be used to determine the nature and extent of the damage in order for the economic value of coral reefs to be recovered.

Feasibility Study for Proposed Legislation

Finally, this project proposes a feasibility study on the impacts of legislation that would establish, as a matter of law, the value of coral reef resources and provide the legal authority to prosecute. It would also authorize a trust fund for damages collected from injuries to coral reef resources. Establishing the cost of damages to coral reefs would serve the accident avoidance goals of tort law. Potential defendants would know the costs of damaging property, and thus may avoid dangerous conduct. Furthermore, the certainty of damage awards would serve to prevent arbitrary, punitive damage awards. Given this certainty potential, defendants could better plan to avoid these harms. The law would facilitate recovery for plaintiffs. With damages established as a matter of law, the costs to recover damages would be significantly lower than if the plaintiff had to prove damages through expert testimony (Edwards 1995). The trust fund will ensure that damages recovered for injuries to coral reefs can be used by resource agencies to further protect or restore coral reefs in their jurisdictions.

As part of the feasibility study, the project will incorporate a review of legal regimes in each US Island to determine if current laws allow local jurisdictions to have the regulatory authority to assess damages to reef resources. Once the regulatory assessment has been completed, recommendations on new regulatory structures or laws that need to be developed to ensure prosecution for offenses will be outlined.

Benefits of Project

Determining the economic value and contributions of coral reefs to US Island jurisdictions will allow resource managers and scientists to factor these values into development, permitting projects, and enforcement actions. If governments, decision-makers, and individuals are more aware of the full economic value of coral reefs when used sustainably, then perhaps the future for coral reefs would not be so bleak (Spurgeon, 1992). US Island jurisdictions can be more fully compensated for damages to reef resources if the managers and scientists are trained in methods to conduct coral reef damage assessments, and if legislation exists to allow these jurisdictions to recover damages.

Budget Estimate

Analyze existing data	$10,000
Fill in data gaps	$115,000
Economic surveys and review	$160,000
Prepare and distribute report	$30,000
Workshop on how to conduct natural resource damage assessments for coral reefs	$80,000
Propose new legislation	$40,000
Total	$445,000

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Project:	**Workshop on Coral Reef Fisheries: Collaboration on Successful Management, Enforcement and Education Methods**
Lead Agency:	Island Fisheries Resource Management Agencies
Priority:	High
Start Date:	FY01
USCRTF Cross-reference:	Coastal Uses working group
Duration:	One week each in FY01 and FY04

Project Description

Fisheries managers are well aware that assessing fishing pressure is just the first step in management of their fishery. There is ample evidence that many coral reefs are overfished, but this knowledge has not often led to corrective action for a variety of reasons, from public disbelief that there really is a problem, to an inadequate enforcement capability, to lack of political support, {to inadequate regulations}. The purpose of this workshop is for island {resource} managers, {fisheries educators and enforcement personnel} to compare methods that have been successful, including regulations that have worked, effective enforcement, and education to reach people who can really effect change. {The program/conference will be coordinated on a rotating basis between island locations based upon agreements reached within the All Islands Coral Reef Initiative Committee. Additional information and participation may be sought from neighboring island regimes to compare and contrast effective research, management and education strategies across regions}.

Benefits of Project

Management actions recommended by fisheries managers, even when supported by convincing data, often go unheeded. Only by gaining public and political support for management measures will effective resource protection occur. Often the issues faced by the islands' managers are the same but the methods used to achieve effective management measures are different. This workshop provides an opportunity to compare methods and develop new techniques based upon successful strategies that have worked elsewhere.

Budget Estimate:	$70,000 in FY01 $75,000 in FY04

Project Name:	**Environmental Law Workshops**
Lead Agencies:	Island Points of Contact, federal law enforcement agencies, and federal, state and territorial prosecutors, investigative agencies, and judges.
Priority:	High
USCRTF Cross-reference:	Relates to Coastal Uses Working Group
Start:	FY2000 or 2001
Duration:	One year

Project Description

There are growing threats to the marine resources in the U.S. flag islands involving threats to wildlife and habitat resources, as well as water and coastal pollution. For example individuals have been recently caught butchering sea turtles, taking other threatened or endangered species, harvesting live rock illegally, or using destructive fishing practices. Chemical and oil-based spills and large vessels running aground on coral reef resources destroy the resources. These incidents are ubiquitous throughout the U.S. flag islands. The resources that are threatened, such as coral reef ecosystems or critically endangered marine mammals, are unique resources that need to be protected. A number of aggressive federal enforcement tools, both civil and criminal, have been developed in recent years that can address these types of problems. Many of these tools provide for opportunities for collaboration among federal and state or territorial enforcement agencies.

The proposed project is to request assistance from the relevant federal enforcement agencies to organize a minimum of three workshops for federal, state and local prosecutors and investigative agencies in the U.S. flag islands. These workshops would provide opportunities to share existing information and experiences about these enforcement authorities, and to explore ways the various jurisdictions can work as partners to address these serious threats. In addition, these workshops provide an opportunity to address how federal standards can be applied to local laws, where appropriate, to give the local authorities greater clout. While it would be preferable to hold a workshop in each island, it is recognized that this may not be feasible from either a cost or time perspective. One workshop could be planned in a western U.S. Pacific island location, a second in an eastern U.S. Pacific island location, and an additional workshop may be planned for the Caribbean region.

Some of the specific enforcement tools that are available that could be the focus of the workshops includes, among others:

- The Lacey Act, 16 U.S.C. 3372, which prohibits the import, export, sale, receipt, possession or transportation of wildlife taken in violation of state, federal tribal or foreign wildlife related law or regulation. "State" is broadly defined to include states,

Commonwealth of Puerto Rico, American Samoa, the U.S. Virgin Islands, Guam, and the Commonwealth of the Northern Marianas.

- Marine Mammal Protection Act, 16 U.S.C. 1362 et seq. Which imposes civil and criminal penalties for direct or indirect taking or importation of marine mammals. The Act applies to CNMI, Puerto Rico, U.S.V.I., American Samoa, ad Guam, and provides that the Secretary of Interior may also designate officers and employees of any State or of any possession of the United States to enforce the provisions of this Act.

- Endangered Species Act, 16 U.S.C. 1531 et seq., which prohibits the taking of any endangered species, including harm through habitat modification and imposes both civil and criminal penalties.

- National Marine Sanctuaries Act, U.S.C. 1431 et seq., which authorizes the United States to recover response costs and damages resulting from the destruction, loss or injury of any sanctuary resources in federally-designated national marine sanctuaries. The Act applies to "any territory or possession of the United States which has a popularly elected Governor."

- Park System Resources Protection Act, U.S.C. 19jj, which authorizes the United States to recover response costs and damages to any National Park system resources.

- Federal pollution laws, which include among others, CERCLA, 42 U.S.C. 9601 et seq.,(liability for natural resource damages that result form hazardous substance releases); Clean Water Act, 33 U.S.C. 1251 et seq.,(requiring permits for point source discharges and discharges of dredged or fill materials, controls on vessel pollution); Oil Pollution Act (liability for removal costs and natural resources damages for discharges of oil or substantial threat or discharge); and Ocean Dumping Act, 33 U.S.C. 1411 et seq.

- Federal sentencing guidelines – Federal criminal sentences, including those for environmental (including wildlife) offenses, are now calculated using a series of published offense characteristics that each federal court must apply, resulting in both stiffer and more uniform federal sentences for environmental offenses. Knowledge of what these guidelines are and how to apply them effectively is essential for both the criminal investigator and prosecutor.

A separate part of the project could involve identifying appropriate judicial forums, at both the federal and territorial or state/local levels, at which federal enforcement agencies and/or noted scientists can speak to raise awareness of the importance of marine resources and habitats.

Benefits of Project

Raising awareness among the U.S. island law enforcement community of the importance of marine resources and their habitats, along with providing specific enforcement tools can go a longs way towards protecting those resources. Coordinated enforcement efforts among federal and state (territorial) or local enforcement agencies can address the problems in a more efficient and comprehensive manner. The proposed project could help generate effective enforcement actions that result in penalties sufficiently high to deter subsequent violations, and appropriate damage awards to adequately restore the resources.

Budget: $150,000 for travel and administrative costs for one or more relevant federal law enforcement agencies to coordinate and host workshops.

APPENDIX

USCRTF Cross-Reference Table 1. US Islands' Projects referenced by US Coral Reef Task Force Working Groups.

	American Samoa	CNMI	Guam	Hawai'i	Puerto Rico	Virgin Islands
Coastal Uses • **Fisheries** • **Vessels** • **Shoreline protection, uses**	M, U	E	G H	A A A, C, D, E, F, H, J, K, L	E, F, H	F
Ecosystem Science & Conservation • **Monitoring** • **Research** • **Conservation**	K, Y E, H, V F	D B, F A	M, N O	C A, D B, H	B, C, D	G
Education & Outreach	G, I, L, N, O, P, Q, R, W,X,Z	B	A, B, C, D, E	H, L	I, J, K, L	B, C, D
Enforcement: Legal & Judiciary	C, D	C	I, J, K	E, F	H	F
International				H		
Mapping & Information Synthesis • **Mapping** • **Assessment**	S		 L	M	 A, D	E A, E, H, I
Water & Air Quality • **Water** • **Air**	A,B, J, T	G	F	A, C, G, H, I	G	G

* Letters indicate projects, which can be referenced in the project section of the document.

Table 2. Coastal Uses.

	Projects fisheries	vessels	shoreline protection, uses, & development	Priority Status
American Samoa				
	M. Inventory of Harvested Invertebrates			**HIGH**
	U. Re-establish giant clams on reefs			**MEDIUM**
Commonwealth of the Northern Mariana Islands				
			E. Marine Debris Removal	**MEDIUM**
Guam				
	G. Coral Reef & Fishing Regulation Pamphlet			**HIGH**
			H. Guam Reef Valuation	**HIGH**
Hawai'i				
	A. Hawai'i State of the Reef Reports	**A. Hawai'i State of the Reef Reports**	**A. Hawai'i State of the Reef Reports**	**HIGH**
			C.Community-Based Management/ Monitoring and Education Initiatives	**HIGH**
			D. Marine Tourism Impacts Assessment	**HIGH**
			E. Investigative Enforcement Support	**HIGH**
			F. Environmental Law Workshop	**HIGH**
			H. Coral Reef Marketing Awareness Campaign / Social Marketing	**HIGH**
			J. Economic Valuation of Reefs	**MEDIUM**
			K. Marine Debris Removal	**MEDIUM**
			L. Coral Reef Education / Certification Program for Commercial Tour Operators Using Marine Protected Areas	**MEDIUM**

Table 2. Coastal Uses (cont.)

Puerto Rico				
			E. Land Use GIS Layers	**HIGH**
			F. Identification of "Hot Spots" and Installation of Coral Reef Signage	**HIGH**
			H. Acquisition of Boats for Surveillance and Enforcement	**HIGH**
US Virgin Islands				
			F. Enforcement	**HIGH**

Table 3. Ecosystem Science and Conservation.

	Projects monitoring	research	conservation	Priority Status
American Samoa				
		E. American Samoa Marine Laboratory		**HIGH**
			F. Coral Reef Program Coordinator	**HIGH**
		H. Expert Fish/Coral Surveys		**HIGH**
	K. Local Survey of Fish & Coral Reef Habitat			**HIGH**
		V. Facilitate research of coral reefs in the outer islands		**MEDIUM**
	Y. Vaoto Marine Park Monitoring			**MEDIUM**
Commonwealth of the Northern Mariana Islands				
			A. Establish & Manage Marine Protected Areas	**HIGH**
		B. CNMI State of the Reef Report		**HIGH**
	D. Marine Monitoring Team Capabilities Upgrade			**MEDIUM**
		F. Research Coral Reef Recruitment		**MEDIUM**
Guam				
	M. Establishment of Coral Reef Biological Monitoring			**HIGH**
	N. Reef Monitoring Outreach			**MEDIUM**
			O. Baseline Coastal Resource Assessment & Guam State of the Reef Report	**MEDIUM**

Table 3. Ecosystem Science & Conservation (cont.)

Hawai'i				
		A. Hawai'i State of the Reef Reports		**HIGH**
			B. Coral Reef Emergency Response Team	**HIGH**
	C.Community-Based Management/ Monitoring and Education Initiatives			**HIGH**
			D. Marine Tourism Impacts Assessment	**HIGH**
			H. Coral Reef Marketing Awareness Campaign / Social Marketing	**HIGH**
Puerto Rico				
	B. Training of Personnel for Monitoring			**HIGH**
	C. Coral Reef Monitoring Program			**HIGH**
	D. Data Management Center			**HIGH**
US Virgin Islands				
	G. Monitoring			**HIGH**

Table 4. Education and Outreach.

	Projects	Priority Status
American Samoa		
	E. Establish the Governor's Task Force on Population	**HIGH**
	I. Meeting Participation for Island Members	**HIGH**
	L. Coral Identification Training	**HIGH**
	N. Community Conservation & Management Workshops	**HIGH**
	O. Marine Resource Education Center	**HIGH**
	P. Envirobus	**HIGH**
	Q. Coral Reef Information Materials	**HIGH**
	R. Coral Reef Education Video	**HIGH**
	W. College Marine Program Enhancement	**MEDIUM**
	X. Coral Reef Information Boards	**MEDIUM**
	Z. Produce and Publish Invertebrate Handbook	**MEDIUM**
Commonwealth of the Northern Mariana Islands		
	B. CNMI State of the Reef Report	**HIGH**
Guam		
	A. Public Education Video for Airlines	**HIGH**
	B. Hands-on Workshop for Decision-Makers	**HIGH**
	C. Support for Public Education	**MEDIUM**
	D. Teacher Workshop	**MEDIUM**
	E. Public Education Interpretive Signs	**MEDIUM**
Hawai'i		
	H. Coral Reef Marketing Awareness Campaign / Social Marketing	**HIGH**
	L. Coral Reef Education / Certification Program for Commercial Tour Operators Using Marine Protected Areas	**MEDIUM**
Puerto Rico		
	I. Coral Reefs and Related Systems General Public Education Program	**HIGH**
	J. Dissemination of Information	**HIGH**
	K. Teacher and Student Training	**HIGH**
	L. Coral Reefs and Marine Related Systems Laws and Regulations Guide	**Medium to HIGH**
US Virgin Islands		
	B. Develop Coral Reef Curriculum for Schools	**HIGH**
	C. Develop Mobile Information Exhibit	**HIGH**
	D. Outreach to the Business Community	**HIGH**

Table 5. Enforcement: Legal and Judiciary Issues.

	Projects	Priority Status
American Samoa		
	C. Revision of Environmental Regulations and Laws	**HIGH**
	D. Enforcement Enhancement	**HIGH**
Commonwealth of the Northern Mariana Island		
	C. Coral Reef-Associated Wildlife Protection	**MEDIUM**
Guam		
	I. Development and Formatting of Legal Regime	**HIGH**
	J. Environmental Education for Contractors	**HIGH**
	K. Environmental Prosecutor	**MEDIUM**
Hawai'i		
	E. Investigative Enforcement Support	**HIGH**
	F. Environmental Law Workshop	**HIGH**
Puerto Rico		
	H. Acquisition of Boats for Surveillance and Enforcement	**High**
	L. Coral Reefs and Marine Related Systems Laws and Regulations Guide	**Medium to HIGH**
US Virgin Islands		
	F. Enforcement	**HIGH**

Table 6. International Issues.

	Projects	Priority Status
American Samoa		
Commonwealth of the Northern Mariana Islands		
Guam		
Hawai'i		
	H. Coral Reef Marketing Awareness Campaign / Social Marketing	**HIGH**
Puerto Rico		
US Virgin Islands		

Table 7. Mapping and Information Synthesis.

	Projects		Priority Status
	mapping	assessment	
American Samoa			
	S. Coral Reef Mapping		**HIGH**
Commonwealth of the Northern Mariana Islands			
Guam			
		I. Guam Reef Atlas	**HIGH**
Hawai'i			
	M. Mapping of Hawaii's Reefs through High Resolution Digital Photography and/or Hyper-Spectral Imaging		**MEDIUM**
Puerto Rico			
		A. Baseline Characterization	**HIGH**
		D. Data Management Center	**HIGH**
US Virgin Islands			
		A. Coral Reef Program Coordinator	**HIGH**
	E. Baseline Information and Research	**E. Baseline Information and Research**	**HIGH**
		H. Comprehensive Assessment of Virgin Islands Marine Resources	**HIGH**
		I. State of the Reefs Report	**HIGH**

Table 8. Water and Air Quality.

	Projects		Priority Status
	water	air	
American Samoa			
	A. Summary of Sedimentation Water Quality Criteria and Control Methods		**HIGH**
	B. Integrated Nearshore and Stream Ecosystem Study		**HIGH**
	J. Island-Wide Ocean Monitoring		**HIGH**
	T. Indicator Organisms of Pollution		**MEDIUM**
Commonwealth of the Northern Mariana Islands			
	G. Nutrient Reduction for Nearshore Marine Waters		**MEDIUM**
Guam			
	F. Coral Reef Water Quality Monitoring Support		**HIGH**
Hawai'i			
	A. Hawai'i State of the Reef Reports		**HIGH**
	C.Community-Based Management/ Monitoring and Education Initiatives		**HIGH**
	G. Linking Watersheds to Coral Reefs-- The Ahupua'a Approach to Resource Management VIDEO		**HIGH**
	H. Coral Reef Marketing Awareness Campaign / Social Marketing		**HIGH**
	I. Control of Land-Based Pollution/ Integrated Watershed Management		**HIGH**
Puerto Rico			
	G. Compile Sediment Run-off Data for Coral Reef Watersheds		**HIGH**
US Virgin Islands			
	G. Monitoring		**HIGH**

1999-2000 Status of the Islands' CRI Activities

The matrix, which appears in the following pages, builds on the US Islands' local coral reef management efforts. To gain an understanding of the coral reef protection and regulations in each jurisdiction, the facilitators and Island CRI Points of Contact constructed a matrix at the American Flag Pacific Islands Coral Reef Initiative Workshop in 1994. The matrices formed a substantial part of the 1994 report and enabled comparisons among the islands. They also helped design a planning process for the development of the Islands' Coral Reef Initiative.

By 1997, when the US Islands met in Maui, great strides had been made in coral reef management in each jurisdiction. The simplest way to reflect these changes was in an updated table, which appeared in the "Blue Book." The general categories of coral reef management covered in these tables include: protection and regulation; monitoring and research; restoration, rehabilitation, and reseeding; education and public awareness; and international technical assistance.

The same categories appear in this updated document for consistency. In addition to the revised 1999-2000 matrix, the previous matrices have been appended to provide a historical record of coral reef management activities for the US Islands. The comparative analyses have enabled some of the jurisdictions to gain support for new programs by using their counterparts as examples. The table shows the activities of each island jurisdiction. Further information can be obtained from the Points of Contact (see Participant's List) who will be able to provide direction to local resource people and experts working in a specified area. In this way, the matrix provides baseline information on coral reef management activities and shows progress over time.

The following tables have been included in the 1999 US All Islands Coral Reef Strategy as reference material. It includes the current updated information, the tables from 1997 for all of the US Islands, and the matrix from the American Flag Islands Coral Reef Initiative in 1994. By sharing information about local coral reef activities, the POCs will continue to build collaboration for coral reef management within the cooperative spirit of the International and US Coral Reef Initiative.

STATUS TABLE 1. 1999-2000 Update: Activities from 1997 to present.

1999-2000 Status	Protection and Regulation GENERAL LAWS OR REGULATIONS GOVERNING CORAL REEFS AND MARINE HABITAT PROTECTION STATUTES OR RULES
American Samoa	No new regulations to date. Department of Marine and Wildlife Resources currently revising fishing regulations and developing a regulation prohibiting use of scuba gear while spearfishing.
Guam	I Tano' Ta Land Use Plan expands boundaries of Territorial Seashore Reserve from ten meters to one hundred meters inland of mean high mark, which allows for (requires) greater setback measures to reduce shoreline erosion, in order to protect nearshore water areas---particularly corals---from sedimentation.
Hawai'i	DLNR: The 1999 Legislature passed Act 85 which allows the Division of Aquatic Resources to create regulations for seasons, bag limits, gear types, and minimum sizes without Legislative approval. Establishment of 35% of Kona Coast, Hawaii as designated fisheries management areas where the collection of aquarium fish is banned, under Act 306, 1998. Fisheries Management areas are established under HRS Chapter 188-53. HRS Chapter 190 Establishes Marine Life Conservation districts in which the taking of coral or other marine life is generally prohibited.
Northern Mariana Islands	No new laws or regulations protecting coral reefs since 1994. No laws or regulations protecting reefs since 1994. CRM - Area of particular concern (APC) special management rules and regulations. CZM - Preservation of valuable coral reef resources, federal consistency review.
Puerto Rico	• 1998 Law 278, Coral reefs rules and regulation under new fishing law rules and regulation • 1998 Law 314, protection and conservation of wetlands as public policy of ELA • 1998 Law 340, declares as public policy of the state the encouragement of ecotourism activities in places of natural value or beauty. • Designation of coral reef grounds of Culebra as natural reserve • Designation of coastal waters of Desecheo island as natural reserve • Designation of no take zones within a marine reserve
US Virgin Islands	CZM laws and regulations, in general, protect coral reefs and other

	coastal features through the permitting process. • Laws governing the operations of V.I. National Park protect all natural resources, including coral reefs. • No general V.I. statutes or rules specifically designed to protect coral reefs or marine habitats exist. However, sites and specie specific regulations do exist.

	CORAL TAKING/HARVESTING & CORAL SPECIES PROTECTION LAWS
American Samoa	No new action.
Guam	Updated fishing regulations provide for stricter use of nets, particularly in areas designated as Marine Preserves.
Hawai'i	DLNR: Established regulations to set minimum size restrictions on the harvest of black coral species. Established an aquaculture facilities license that allows the culturing of live rock for commercial sale and which may allow for the culturing of live coral for commercial sale.
Northern Mariana Islands	Restrictions on taking coral have not changed since 1994. The Coastal Resources Management Office Lagoon and Reef APC use standards prohibit the taking of coral dead or alive.
Puerto Rico	• 1998 Law 278, Coral reefs rules and regulation under new fishing law, prohibit anchoring on coral reefs, sea grass beds and has limitations on fishing gear as a resource to protect benthic habitats. • 1998 Law 1466 Coral Reefs Law • Coral Reef Management Plan
US Virgin Islands	Code federal regulations governing the operation of V.I. National Park prohibits the harvesting of all types of corals. V.I. park rangers enforce three regulations. Department of Planning & Natural Resources enforces title 12, chapter 21 which prohibits the taking of all minerals including corals without obtaining a permit.

	DRILLING, BLASTING, AND DREDGING
American Samoa	No new action.
Guam	No change.
Hawai'i	Same as 1997
Northern Mariana Islands	• Prohibitions of coral drilling, blasting and dredging.

	• ACOE permitting requirements apply. • DEQ Sec. 401 Water Quality certification.
Puerto Rico	• 1998 Law 278, Coral reefs rules and regulation under new fishing law rules and regulation and limitations of fishing gear as a resource to protect benthic habitats • Coral reef management plan (in progress)
US Virgin Islands	Title 12 of the Virgin Islands code prohibits the taking of all natural products of the sea, except fish and wildlife without first obtaining a coastal zone permit. This includes mining which refers to drilling, blasting, and dredging. Title 36 of the CFR prohibits such activities within the National Park services boundary as well.

	AGENCY ENFORCING REGULATIONS
American Samoa	No new action.
Guam	No change.
Hawai'i	Same as 1997: Division of Conservation and Resources Enforcement (DOCARE), Hawai'i State Department of Land and Natural Resources.

Northern Mariana Islands	• §404 and §10 permit programs, administered by the USACOE • CNMI DEQ administers the Clean Water Act §401Water Quality Certification Program • §10 of the River and Harbors Act of 1899 require DA permits from USACOE to conduct activities in traditionally navigable waters, which can include wetlands. • CWA §404 requires a DA permit from USACOE for discharge of dredged or filled materials in waters of the US, including wetlands. • PL 3-47 and CRM regulations also regulate these activities.
Puerto Rico	Under fisheries 1998 Law 278, defines enforcing agents and includes state and municipal enforcing agents, besides the DNER ranger corps.
US Virgin Islands	The National Park Service enforces such rules within park waters, while DPNR enforcement officers enforce the V.I. code.

	RESTRICTIONS ON ANCHORING
American Samoa	No new action.
Guam	32 new multi-user anchor buoys have been put in place in most popular dive locations.
Hawai'i	DLNR: Act 306 1998 Session Laws of Hawaii requires the establishment of designated no anchoring zones and the installation of additional day-use moorings along 150 mile section of the Kona Coast. Additional 60 day-use mooring buoys have been installed statewide.
Northern Mariana Islands	No restrictions. DFW and private dive operators have installed new and improved transient mooring buoys at popular dive sites.
Puerto Rico	• Continue deployment and maintenance of mooring buoys (100 buoys) • New fishing rules and regulation specifically prohibit anchoring over coral reefs and seagrass beds.
US Virgin Islands	Title 25, of the V.I. code, chapter 16 regulates mooring and anchoring vessels in Virgin Islands waters. Among other things, the law was designed to protect fragile ecosystems including coral reefs. Title 25 Virgin Islands Rules & Regulations was adopted to supplement this code. The National Park Service has installed moorings in strategic locations within their jurisdiction around to St. John. In addition, Planning & Natural Resources issues mooring permits to applicants. Also, an interest group, Anchors Away, has installed moorings at dive sites.

	RESTRICTIONS ON VESSEL DISCHARGE
American Samoa	No new action.
Guam	Two pump-out stations will be in place by 2000.
Hawai'i	DOH: no designated no discharge zones. All class AA waters

	require “no zone of mixing” which is a similar designation.
Northern Mariana Islands	No changes since 1994. DFW’s regulations prohibit vessels from discharging sewage near land or within designated marina areas. Other restrictions and guidance fall under DEQ regulations, CNMI Constitution, and US Coast Guard.
Puerto Rico	At present 8 participating marinas with 11 units – sanitary boats 9 pump-out stations and 2 pump stations. 20 units proposed for 1999-2000 will include operation and maintenance
US Virgin Islands	Title 25, chapter 16, see 408 (c) prohibits the discharge of any and all pollutants within the territorial waters of the Virgin Islands. However, regulations are loosely enforced in relation to sewage, because, no pump out facilities existed in the Virgin Islands until recently.

	POINT SOURCE DISCHARGE CONTROLS
American Samoa	No new action.
Guam	Guam's Clean Water Action Plan, in progress, is undertaking studies to determine sources of pollution in shoreline, fresh water seeps in order to take corrective measures. Plans are in place to correct storm water drainage into Tumon Bay through horizontal drilling and deeper water outfalls. Guam is in planning process for extending sewer outfall pipes into deeper waters farther from reefs through horizontal drilling.
Hawai‘i	Same as 1997
Northern Mariana Islands	No changes since 1994. EPA administers the NPDES and DEQ administers the 401 permit programs, and the Corps regulates discharge of material into navigable waters of the US. CWA prohibits discharges from a point source into waters of the US without a permit. The recent modification of the definition of “discharge of dredged material,” called the “Tulloch Excavation Rule,” clarified that certain material removal activities (excavation, channelization, land clearing, etc.) are also regulated under the §404 program, but this rule is being challenged in court.
Puerto Rico	Federal Clean Water Act • Environmental Quality Board • DNER, EPA
US Virgin Islands	In addition to federal laws, the previously cited Virgin Island statute applies to all point source discharges. The statute applies not only to coral reef areas, but all natural aquatic features.

	REGULATORY MEASURES TO CONTROL NON-POINT SOURCE POLLUTION
American Samoa	No new action.

Guam	I Tano' Ta Land Use Master Plan contains adopted rules for Vegetative Standards, Landscaping Standards, and Wetland Standards, all of which are designed to reduce non-point source (NPS) runoff and pollution, or to protect areas which filter and contain NPS pollution. Impervious Surface Standards will be introduced as regulation in 2000.
Hawai'i	The State's Attorney General will issue a legal opinion on whether or not existing state enforcement authorities can be used to prevent nonpoint pollution and required management measure implementation. If not, the State will develop a strategy to establish the necessary enforcement authorities. Current regulatory measures in the State are described in Hawaii's coastal Nonpoint Pollution control Program management Plan. These include grading and grubbing ordinances within the counties for construction projects.
Northern Mariana Islands	• CNMI is upgrading the conditionally approved NPS plan, created pursuant to CZM §6217, in an effort to receive fully approved status. • DEQ earth moving permits will be changed to include proper management of toxic substances and nutrients for all size projects. • DEQ has and will continue to conduct various projects on Saipan, Tinian, and Rota to demonstrate how BMPs such as constructed wetlands and low cost bioengineering techniques will prevent and control NPS. • CRM and DFW created a marina BMP plan for the Smiling Cove Marina. • Proposed controls in the NPS pollution plan have been conditionally approved by OCRM. Full approval of the plan is expected September 1999.
Puerto Rico	Non-Point Source Pollution Implementation Act
US Virgin Islands	The broad range of the CZM act is the current regulatory measure used to control non-point source pollution in the coral reef areas. However, the problem of non-point source pollution is attributed to land based activities. Therefore, the CZM permit applications have been modified to mitigate the land-based related non-point source problems. Regulations have been drafted to revise the earth change laws. These regulations are proposed through the Virgin Islands non-point source program.

	COMPLETION OF CZM §6217 NON-POINT SOURCE POLLUTION PLAN
American Samoa	The NPSP plan is in the implementation stage; this is a joint effort with ASEPA and ASCMP.
Guam	Approval expected before the end of 1999. Elements addressing conditions to previously granted approval are being submitted to OCRM, and full integration of Section 319, Section 6217, and the

	Clean Water Action Plan is being accomplished.
Hawai'i	DOH and HCZM are coordinating the development of an implementation plan for Hawaii's Coastal Nonpoint Pollution Control Program. The plan will include long-term goals as well as 5 and 15 year strategies to control nonpoint pollution from six source categories – forestry, agriculture, urban areas, marinas and recreational boating, hydromodifications, and wetlands. The State will also implement watershed restoration action strategies in five priority watershed regions identified in the State's Unified Watershed Assessment.
Northern Mariana Islands	Draft was submitted in late 1994, and it received conditional approval from OCRM. CNMI is currently revising the plan to receive full approval.
Puerto Rico	Non-Point Source Pollution Plan was signed by the Governor
US Virgin Islands	V.I. will complete its non-point source program when the proposed regulations are implemented. We are hoping to have this completed in the very near future.

1999-2000 Status	Monitoring and Research **INVENTORY AND DATABASE OF CORAL REEF SURVEYS AND MONITORING ACTIVITY**
American Samoa	NPSA developing their database. Fagatele Bay National Marine Sanctuary (NBNMS) participating in Protected Areas GIS (PAGIS) program in NOAA.
Guam	The University of Guam Marine Laboratory (UOG Marine Lab) compiles information from annual "Reef Check." Guam EPA, Department of Agriculture, and UOG conducted general surveys after Typhoon Paka (12-97).
Hawai'i	UH/DLNR: A Memorandum of Understanding (MOU) was signed in 1998 between the University of Hawaii and DLNR for the creation of the Hawaii Coral Reef Initiative Research Program. Through funding allocated from NOAA, the main goal of the program is to administer research and monitoring projects that improve the management of coral reef ecosystems and build management capacity within the state. Under this program the Coral Reef Assessment and Monitoring Program (CRAMP) was funded and is compiling a database of all previous historical data sets from previous monitoring activity. FWS-Hawaii is spearheading a new program to develop a Marine Environmental Geographic Information System (MEGIS). This interagency GIS system is being developed as a means of rapid communication between scientists, managers, NGO's and private individuals.

Northern Mariana Islands	Changes since 1997: • CRM is now developing its GIS system to include coral reefs and monitoring. The technology will be shared with all interested agencies (DEQ, DPL, CUC, DPW, and DFW).
Puerto Rico	• Puerto Rico coral reef data bank • Reassessment of coral reef inventory following the last one done in 1992 • Baseline Characterization of coral reefs in natural reserves jurisdiction (DNERR) (Jobos Bay, Caja de Muertos, Guanica, Tourmaline, Fajardo) and revision of management plan • Currently in progress, bottom characterization of La Parguera started in 1998 • Bottom characterization of west coast platform from Mayagüez to Cabo Rojo, east coast platform including Vieques and Culebra Islands • Bottom characterization of Mona island platform. (In Progress) • Digital benthic habitat of USVI and PR. Using photometry in remote sensing techniques (In progress)
US Virgin Islands	The National Park Service has an ongoing inventory and monitoring program within park controlled waters. In addition, the fish and wildlife division in the Department of Planning and Natural Resources and UVI conduct monitoring of reefs in the area.

	COMPREHENSIVE ASSESSMENT OF CORAL REEF CONDITION
American Samoa	Fagatele Bay National Marine Sanctuary (FBNMS).
Guam	No change.
Hawai'i	DLNR: Published a *State of the Reefs Report* for 1998 that outlines current management concerns for Hawaii's coral reefs. CRAMP has undertaken the study of 31 survey sites within the main Hawaiian Islands to do a long-term assessment of coral reef resources and serve as the primary indicators of coral reef condition in the sites chosen.
Northern Mariana Islands	DEQ, DFW, NMC, and CRMO have formed a Marine Monitoring Team that has been observing the health of coral reefs. This is an ongoing program.
Puerto Rico	Proposed: Islandwide assessment of coral reef conditions, including use of side scan sonar and other techniques to gather data
US Virgin Islands	None.

	AGENCY REGULARLY MONITORING REEF
American Samoa	FBNMS.
Guam	UOG Marine Lab, Guam EPA, and Department of Agriculture (Division of Aquatic and Wildlife Resources).

Hawai'i	DLNR: A five year study of 24 sites was initiated along the Kona coast as a part of the designation of 35% of the coast as no collection areas for aquarium fish. Additional monitoring continues as was indicated in 1997.
Northern Mariana Islands	DEQ, DFW, NMC, and CRMO have formed a Marine Monitoring Team that has been observing the health of coral reefs. This is an ongoing program.
Puerto Rico	CARICOMP Coral Reef Monitoring Program, La Parguera, Puerto Rico
US Virgin Islands	No agency is monitoring coral reefs as a long-term programmatic task. What we do have are several multiple personal initiatives by Professors, Students and Volunteers. The following are examples: • Individual professors and students monitor coral reefs at specific sites. • Dr. Jorge García- CARICOMP benthos and fish annually, Turrumote • Prof. Edwin Hernandez- Cordillera, Viequez and Culebra • Dr.Vance Vicente- Viequez, Culebra • Dr. Jack Morelock • Dr. Paul Yoshioko • Dr. Jorge Corredor

	HEALTH OF CORAL REEFS STUDIES
American Samoa	Proposed for 2000 (Green and Mundy).
Guam	Continuously by UOG Marine Lab, GEPA, and Division of Aquatic and Wildlife Resources.
Hawai'i	DNLR: Funding Research studies through the Main Hawaiian Islands Marine Resources Investigation (MHI-MRI) by the UH on several anthropogenic effects on reefs such as heavy metal accumulation, sedimentation/runoff effects, etc. Additional research being done by UH Hawaii Institute of Marine Biology.
Northern Mariana Islands	No changes.
Puerto Rico	Dr. Williams - Bleaching, coral diseases, urchin mortality.
US Virgin Islands	None identified.

	WATER QUALITY MONITORING
American Samoa	NPSA and FBNMS currently conducting temperature monitoring, plans to add other in situ monitoring devices.
Guam	Analysis of receiving waters for rivers, streams, and fresh water seeps are conducted regularly in support of Guam watershed strategies being developed and adopted by the Guam Water Planning Committee. Watershed strategies are including the resources of impacted reefs as direct linkages to watershed health

	and planning. Sediment analysis instigated by Guam Coastal Management Program under contract to UOG Water and Environmental Research Institute tested the quality of both sediments and water column in order to begin developing determinations of levels of toxins accumulating in both harvested and non-harvested biology.
Hawai'i	DOH: No routine monitoring of water quality on coral reefs, either within the water column or on coral reef substrate. Monitoring of some beaches for bacteria and health risks, measuring TMDL's in streams and monitor stream water quality for health concerns. Program has not changed.
Northern Mariana Islands	No changes.
Puerto Rico	JBNERR continues with Long-Term Water Monitoring Program Coral cover reduction as a result of high sediment stress in Puerto Rico. Juan L.Torress, U.P.R.
US Virgin Islands	No change.

1999-2000 Status	Restoration, Rehabilitation, and Reseeding CORAL REEF RESTORATION PROGRAM
American Samoa	Some restoration is proposed for the Aua-Leloaloa reef where nine longliners have been grounded for 8 years and will be removed in 1999-2000. NOAA is heading the restoration project.
Guam	While Guam does not agree that reefs can be "restored," they can nonetheless be rehabilitated to a degree, and reseeding can be successful to a limit. UOG Marine Lab is taking the lead in reseeding areas of Tumon Bay with laboratory cultivated corals, and is researching the use of cultivated corals in reseeding other areas which have been badly degraded through sedimentation. One area of Apra Harbor received rehabilitation efforts in 1998 after scouring by Typhoon Paka. Broken corals were replaced and regrowth has been successful, however, the reef ecosystem has been altered due to the loss of some coral species, which could not be recovered or reseeded.
Hawai'i	Same as 1997
Northern Mariana Islands	CRMO and Corps permits require developers to relocate coral from dredging sites, along with other forms of mitigation.
Puerto Rico	• Restoration of grounding site at María Langa reef in Guayanilla by Dr. Vance Vicente • Coral restoration and transplantation at Guánica National Forest • Coral restoration at Mona Island natural reserve on area

	impacted by vessel grounding (fortuna reefer) • Fisheries recruitment and enhancement with REEF Balls in Fajardo Reefs.
US Virgin Islands	No projects identified.

	CORAL BREEDING
American Samoa	None.
Guam	During the 1998 and 1999 spawning events, eggs and sperm were collected from 11 species of coral representing massive encrusting and branching growth forms. Larvae were produced from controlled laboratory crosses, with cultures ranging from 200 larvae in small beakers to several thousand larvae in large tubs. Techniques for coral cultivation were simplified and expanded, based on previous work. Larvae were settled on substrata for grow-out experiments, and were also used in tests on the effects of selected pollutants on coral reproduction and recruitment. Individual coral colonies collected from the field in 1998, and replaced following that spawning event, were collected again in 1999, and produced eggs and sperm at normal levels. Approximately 100 young coral colonies resulting from larvae settled this summer will be placed on reefs around Guam to study survivorship and growth in the field versus the laboratory.
Hawai'i	Ongoing research as indicated previously. UH/DLNR: HCRI Research Program funded genetics study on differentiation of coral sub populations.
Northern Mariana Islands	No changes.
Puerto Rico	None.
US Virgin Islands	No public projects exist.

Education and Public Awareness

	GENERAL PUBLIC EDUCATION AND AWARENESS PROGRAMS TO PREVENT DEGRADATION
American Samoa	Agency coordinating group Le Tausagi is the vehicle for educational programs for ASCMP, ASEPA, FBNMS and NPSA.
Guam	• Between September 1997 and September 1999, the Guam Coastal Management Program's television show *Man, Land, and Sea* has aired eight half-hour shows devoted to coral reef ecosystem topics, with each show aired three times per month in prime time. In addition, the ten segments devoted to reef species are aired as filler throughout the broadcast day, an average of three times per day, which translates to more than thirty-six and a half hours of television time for filler only since

	June 1996. Upcoming episodes will be devoted to reef restoration efforts, destructive fishing practices, and reef biodiversity. • In this same time period, the GCMP newsletter, also called *Man, Land, and Sea* has devoted articles to reef clean-ups, fishes that may carry Ciguatera toxins, coral reef initiative efforts, coral cultivation, Guam's Marine Preserves, and the new fishing regulations. presentations • DAWR is assisting high school students in developing a coral reef education CD-Rom for classroom use, which will be completed in 1999. • In 1998, UOG conducted a one-week coral cultivation workshop which was opened to all residents, as well as to regional scientists and reef managers from throughout the Pacific. • DAWR is developing a coral reef, village-to-village road show, designed to provide education to users of the reef, as well as to facilitate a two-way communications link between the scientists/managers/regulators and the resource users. • UOG Marine Lab, Guam EPA, and DAWR have distributed, free of charge, between 3,500 and 4,000 coral reef videos (*Coral Reefs: Their Health, Our Wealth).* • Guam is purchasing equipment (aquariums, microscopes, pollution test kits, dissecting equipment, underwater camera, etc.) which will be loaned to high school students as encouragement to pursue coral reef ecosystem related projects for island science fairs.
Hawai'i	CZM through CRI/NOAA funds: • Development of an educational video to place on airlines on coral reefs • Establishment of a Hawaii coral reef network web page (has not been updated for two years) • Reef monitoring program with Kauai High school students • Coral reef brochure developed by Pacific Whale Foundation (PWF) [in draft] • Coral reef naturalist training by PWF • Coral reef volunteer monitoring program and training in West Hawaii w/ UH Sea Grant DLNR: • Hawaii State of the reefs report 1998 • Proceeding from the international coral reef monitoring workshop (in press) • Fishing etiquette on our reefs TV PSA

	• coral Reef educational display • Project Wild Aquatics teacher training and curriculum (Additional Programs and products listed in the Hawaii State of the Reefs Report) some programs listed in 1997 ongoing.
Northern Mariana Islands	Changes since 1997: • DEQ has produced a video to educate people on the effects of non-point source pollution on coral reefs. • CRM has made two atlases, one for Saipan and the other for sensitive areas in CNMI. Both of these are available to the public.
Puerto Rico	• Education plan for coral reefs in progress (DNERR) • Educational guide for the use of the marine coastal ecosystems poster that include coastal reefs. • Secondary School Curriculum: Arrecifes de Coral: Una Colección de Actividades en Español para Estudiantes de Escuela Intermedia.
US Virgin Islands	No general public coral reef education programs exist currently.

	SPECIFIC PUBLIC EDUCATION AND AWARENESS PROGRAMS ABOUT LAWS AND REGULATIONS
American Samoa	FBNMS, DMWR Fishers' Expo '99
Guam	Continue to distribute posters, flyers, activities booklets, strip film presentations, school visit program, television and radio public service spots.
Hawai'i	DLNR: "Hawaii State of the Reefs Report 1998"
Northern Mariana Islands	No changes.
Puerto Rico	Puerto Rico Ecotourism Law
US Virgin Islands	None.

	International Technical Assistance **CONTACT PERSON**
American Samoa	No new action.
Guam	Scientists and resource managers from UOGML, DAWR, and GCMP have helped with coral reef issues in a number of other countries, including: Palau, Yap, Kosrae, Pohnpei, Chuuk, Saipan (CNMI), Ecuador (Galapagos Islands), Cook Islands. Contacts: Drs. Robert Richmond, Charles Birkeland, Gustov Paulay, University of Guam Marine Laboratory, UOG Station, Mangilao, Guam 96923

	Phone: 671-735-2176; Fax: 671-734-6767
Hawai'i	State of Hawaii Department of Land and Natural Resources, 1151 Punchbowl St., Rm. 330, Honolulu HI 96813; Fax: (808) 587-0115. For coral issues: Dave Gulko (808) 587-0318 For reef/aquarium fish issues: Dr. Bill Walsh (808) 328-8041 For mooring/ocean recreation issues: Athline Clark (808) 587-0099
Northern Mariana Islands	
Puerto Rico	Jobos Bay National Estuarine Research Reserve, Call Box B, Aquirre, Puerto Rico 00704. Phone: (787) 853-4617; Fax: (787) 853-4618.
US Virgin Islands	Both the National Park Service and the Eastern Caribbean Center at the University of the Virgin Islands provide technical assistance to other islands in the eastern Caribbean. The Research Division of the National Biological Survey at Virgin Islands National is involved. Contacts would be directly to the Superintendent at the Park, at UVI Eastern Caribbean, the contact is Dr. Henry Smith.

1999-2000 Status	Other PROGRAMS AND INITIATIVES TO MANAGE CORAL REEFS
American Samoa	1999: American Samoa Coral Reef Advisory Group held a workshop to develop a five year plan for coral reef management. A report was prepared.
Guam	No change since 1997.
Hawai'i	See above.
Northern Mariana Islands	No changes.
Puerto Rico	Technical Training Workshop was held with the participation of Government, University and NGO's. An Interagency Coral Reef Committee was Organized By CZM
US Virgin Islands	Programs started (some programs mentioned above) include designating marine protected areas, monitoring, statutes (non-point source pollution), and educational processes.

STATUS TABLE 2. 1997 US Islands Coral Reef Initiative Status: Activities from 1994 to 1997.

	Protection and Regulation GENERAL LAWS OR REGULATIONS GOVERNING CORAL REEFS AND MARINE HABITAT PROTECTION STATUTES OR RULES
American Samoa	• Department of Marine and Wildlife Resources: regulations against dynamiting, poison fishing, taking of corals above 60 ft., fishing restrictions; • Fagatele Bay NMS Regulations: No take of corals, invertebrates; fishing restrictions; no discharges; • Fish and Wildlife Service Regulations: complete protection through restricted access to Rose Atoll National Wildlife Reserve; • National Park of American Samoa regulations are currently in draft; CRF 36:2 §2.1-2.3 regulations for National Parks currently are only ones in authority; • American Samoa Coastal Management regulations that are geared toward individual and commercial development address coral reef issues. No specific marine habitat protection laws.
Guam	Guam Water Quality Standards (GEPA), Requirement for EPP & EIA on proposed projects (GEPA), Territorial Seashore Protection Act (DLM), Submerged Land-Lease requirements (DLM), ACOE Permit requirements, Federal Consistency under CZM (GCMP), P.L. 24-21 (regulating fisheries and creating 5 Marine Preserves, approx. 10% of the shoreline).
Hawai'i	No new laws or regulations since 1994. CZM: Preservation of valuable coral reef resources; Federal consistency review. DLNR: Establish & manage Marine Life Conservation Districts in which taking of coral or altering substrate are normally prohibited.
Northern Mariana Islands	No new laws or regulations protecting coral reefs since 1994.
Puerto Rico	• Planning Board Organic Law • Environmental Policy Act • DNER Organic Law • CES Erosion Control and Sedimentation No marine habitat protection laws.
US Virgin Islands	CZM laws and regulations, in general, protect coral reefs and other coastal features through the permitting process.

	• Laws governing the operations of V.I. National Park protect all natural resources, including coral reefs. • No general V.I. statutes or rules specifically designed to protect coral reefs or marine habitats exist. However, sites and specie specific regulations do exist.

	CORAL TAKING/HARVESTING & CORAL SPECIES PROTECTION LAWS
American Samoa	• Department of Marine and Wildlife Resources Regulations: no taking of corals above 60 ft. depth; commercial harvesting must be licensed. • Fagatele Bay NMS Regulations: no take of coral • Fish and Wildlife Service Regulations: no take of coral • National Park of American Samoa regulations: generally protect all natural resources. • ASCMP has a number of objectives and policies which directly relate to corals described in the ASCMP administration Rules.
Guam	General fishing regulations and statutes prohibit taking of or damage of corals (all types). Lacey Act. CITES (DAWR).
Hawai'i	DLNR: HRS 188-68 prohibits the intentional taking of, breaking or damaging any live stony coral including any live reef or mushroom coral. Eight species are identified in the statute. Exceptions may be granted for certain scientific, educational or other public purpose if adverse impacts are minimized.
Northern Mariana Islands	Restrictions on taking coral have not changed since 1994. The Coastal Resources Management Office Lagoon and Reef APC use standards regulate the taking of coral.
Puerto Rico	• 1968 Sand/Grave/Stone Law • 1979 Regulation to Control the Extraction, Possession, Transportation, and Sale of Coral Resources in Puerto Rico. • All corals are covered (stony, horny, black, hydrocoral) living and dead.
US Virgin Islands	Code federal regulations governing the operation of V.I. National Park prohibits the harvesting of all types of corals. Three regulations are enforced by V.I. park rangers. Department of Planning & Natural Resources enforces title 12, chapter 21 which prohibits the taking of all minerals including corals without obtaining a permit.

	DRILLING, BLASTING, AND DREDGING
American Samoa	• Department of Marine and Wildlife Resources Regulations: no dynamiting, drilling or blasting without permit • Fagatele Bay NMS Regulations: these activities are prohibited • Fish and Wildlife Service Regulations: none permitted • National Park of American Samoa regulations would apply • ASCMP (see question 3)
Guam	ACOE Permit. Drilling and dredging require permit under Territorial Seashore Protection Act (DLM). Federal Consistency requirements (GCMP). Use of explosives is specifically prohibited in territorial waters

	by statute.
Hawai'i	DLNR: HRS 188-23 prohibits possession of explosives for taking of aquatic life. Drilling, dredging, and blasting in nearshore waters requires Conservation District Use Permit. Because ACOE permit is also required, CZM would conduct Federal consistency review. If permit based on CWA §404 permit, then Water Quality Certification from DOH also mandatory.
Northern Mariana Islands	• Prohibitions of coral drilling, blasting and dredging.
Puerto Rico	• No direct Law or Regulation. • Fisheries Law 80, Article 20 prohibits the use of explosive for fishing. • Article 24 prohibits the use of noxious substances for fishing. • DNER
US Virgin Islands	Title 12 of the Virgin Islands code prohibits the taking of all natural products of the sea, except fish and wildlife without first obtaining a coastal zone permit. This includes mining which refers to drilling, blasting, and dredging. Title 36 of the CFR prohibits such activities within the National Park services boundary as well.

	AGENCY ENFORCING REGULATIONS
American Samoa	Several agencies have authority to enforce the specific laws listed previously.
Guam	Enforcement is done by Guam Police Department and 16 Conservation Officers (trained, armed peace officers) within DAWR.
Hawai'i	Division of Conservation and Resources Enforcement, Department of Land and Natural Resources (DOCARE/DLNR).
Northern Mariana Islands	• §404 and §10 permit programs, administered by the USACOE • CNMI DEQ administers the Clean Water Act §401Water Quality Certification Program • §10 of the River and Harbors Act of 1899 require DA permits from USACOE to conduct activities in traditionally navigable waters, which can include wetlands. • CWA §404 requires a DA permit from USACOE for discharge of dredged or filled materials in waters of the US, including wetlands. • PL 3-47 and CRM regulations also regulate these activities.
Puerto Rico	The Department of Natural and Environmental Resources, DNER.
US Virgin Islands	The National Park Service enforces such rules within park waters, while DPNR enforcement officers enforce the V.I. code.

	RESTRICTIONS ON ANCHORING
American Samoa	• Fagatele Bay NMS Regulations: no anchoring in coral; two mooring buoys in place 1992-1993, (not replaced) • Fish and Wildlife Service Regulations: no anchoring in coral • National Park of American Samoa regulations would apply
Guam	There are currently no prohibitions to anchoring on reefs, but regulations to address this are currently being drafted by DAWR. A permit to place 40 day mooring buoys is currently in process and is being held up by USCG in Honolulu, which wants to require lights on buoys which will create a navigational hazard and make costs prohibitive.
Hawai'i	DLNR: HRS 190 authorizes regulation of anchoring & mooring in Marine Life Conservation Districts (MLCDs); or requires permits to anchor in MLCDs. HRS 200 restricts boats in certain reef areas; over 125 day-use mooring buoys have been installed and anchoring is prohibited within 100 yards of each mooring. CZM: HRS 205A-2. One of the CZM objectives is to protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems
Northern Mariana Islands	No restriction. DFW and private dive operators have installed new and improved transient mooring buoys at popular dive sites.
Puerto Rico	No restrictions. • 90 buoys have been installed and 100 more will be installed in the next 2 years. • Cases of damage of corals by anchoring are been treated as an extraction for legal purposes.
US Virgin Islands	Title 25, of the V.I. code, chapter 16 regulates mooring and anchoring vessels in Virgin Islands waters. Among other things, the law was designed to protect fragile ecosytems including coral reefs. Title 25 Virgin Islands Rules & Regulations was adopted to supplement this code. The National Park Service has installed moorings in strategic locations within their jurisdiction around to St. John. In addition, Planning & Natural Resources issues mooring permits to applicants. Also, an interest group, Anchors Away, has installed moorings at dive sites.

	RESTRICTIONS ON VESSEL DISCHARGE
American Samoa	• Fagatele Bay NMS Regulations: no discharges permitted; restrictions are not enforced (currently limited enforcement presence) • ASEPA: Discharges from vessels of sewage, pollutants, or hazardous material or waste are prohibited in inshore areas. These are enforced locally by the Marine Patrol of the Department of Public Safety who provide surveillance of the Pago Pago Bay areas, the areas where vessels are concentrated, around the clock. Citations and fines of up to $1,000 may be issued.

	• USCG
Guam	US Coast Guard Regulations and Guam EPA water quality regulations.
Hawai'i	DOH: All vessel discharges are regulated in State waters; Clean Water Act, § 404. USCG: Has OPA 90 rules in effect. USCG enforces vessel discharge regulations.
Northern Mariana Islands	No changes since 1994. DFW's regulations prohibit vessels from discharging sewage near land. Restrictions fall under DEQ regulations, CNMI Constitution, and US Coast Guard.
Puerto Rico	1986 Vessel Discharge Law • Clean Vessel Act, under Clean Water Act • Two Sanitary Boat Pumps have been installed in Puerto Rey and Isla de Marinas with two more scheduled. • Enforcement depends on Ranger Corps, DNER
US Virgin Islands	Title 25, chapter 16, see 408 (c) prohibits the discharge of any and all pollutants within the territorial waters of the Virgin Islands. However, regulations are loosely enforced in relation to sewage, because, no pump out facilities existed in the Virgin Islands until recently.

	POINT SOURCE DISCHARGE CONTROLS
American Samoa	• Fagatele Bay NMS Regulations: no discharges permitted • ASEPA: The Clean Water Act and its implementing regulations require that all point source discharges to waters of the US must obtain a National Pollutant Discharge Elimination System permit for the discharge. This is fully implemented in AS. It is enforced by review of quarterly reports submitted by the dischargers and by facility inspections by ASEPA and USEPA personnel. Both agencies have authority to issue notices of violation and administrative orders for violations of permit conditions or standards. • USCG • ASCMP (via PNRS)

Guam	Guam Water Quality Standards, as well as US federal standards regulate discharges and enforcement is handled by GEPA and the US Coast Guard. Point and non-point discharges are monitored and regulated by GEPA. These issues are addressed through planning and mitigation through the permit process. Guam EPA conducts weekly water tests of coastal marine waters and reports results to the public in a media press release. Federal law requires burning of some vessel wastes (garbage) and a single incinerator exists for that purpose at Port of Guam. Monitored by GEPA and USCG. Pump out stations are being installed at major port and marina sites, which should reduce illegal discharges.
Hawai'i	DOH: NPDES permit is the primary regulation and control of discharges in coral reef areas. Applications are reviewed for their impact of aquatic ecosystems by DLNR and for consistency with CZM objectives. The NPDES permit is required in all counties for sewage treatment systems. The NPDES permit is required for all industrial source and storm water runoff for the City and County of Honolulu. Counties have promulgated requirements for construction sites. US Fish & Wildlife Service and NMFS have programmatic monitoring and enforcement responsibilities.
Northern Mariana Islands	No changes since 1994. DEQ administers the NPDES and 401 permit programs, and the Corps regulates discharge of material into navigable waters of the US. CWA prohibits discharges from a point source into waters of the US without a permit. The recent modification of the definition of "discharge of dredged material," called the "Tulloch Excavation Rule," clarified that certain material removal activities (excavation, channelization, land clearing, etc.) are also regulated under the §404 program, but this rule is being challenged in court.
Puerto Rico	Federal Clean Water Act • Environmental Quality Board • DNER, EPA
US Virgin Islands	In addition to federal laws, the previously cited Virgin Island statute applies to all point source discharges. The statute applies not only to coral reef areas, but all natural aquatic features.

	REGULATORY MEASURES TO CONTROL NON-POINT SOURCE POLLUTION
American Samoa	• ASEPA • ASCMP
Guam	GEPA NPDES Permits - requirements for erosion control plans in development and storm water regulations. Proposed measures include: Small feed lot regulations, vegetation standards for development, black

	out periods for clearing and grading (under discussion), limitations on maximum land area to be cleared (incremental clearing) per project per time period (under discussion), formal training for contractors on development related cause and effect in Guam's environment (under discussion).
Hawai'i	The State submitted Hawaii's Coastal Nonpoint Pollution Control Program Management Plan to NOAA and EPA in 1996. The plan contains 57 management measures and describes regulatory and non-regulatory measures at the State and County level to control nonpoint sources of pollution.

Northern Mariana Islands	CNMI has a new NPS plan, created pursuant to CZM §6217, that has been conditionally approved. DEQ is conducting a secondary road improvement project to employ BMPs to minimize NPS pollution from our coral roads. DEQ is stabilizing highly erodible lands (volcanic soil on badlands), employing BMPs to minimize runoff and erosion. DFW created a marina BMP plan for the Smiling Cove Marina, but the plan has yet to be implemented. DEQ formed a Marine Monitoring Team that has been monitoring coral reef health, and observes changes in health that could be caused by NPS pollution. Proposed controls in the NPS pollution plan have been conditionally approved by OCRM and DFW has prepared a BMP plan to minimize NPS pollution that has yet to be implemented.
Puerto Rico	CES Proposed measures include: • Coastal Zone Legislation • Non-point Source Pollution Management Plan
US Virgin Islands	The broad range of the CZM act is the current regulatory measure used to control non-point source pollution in the coral reef areas. However, the problem of non-point source pollution is attributed to land based activities. Therefore, the CZM permit applications have been modified to mitigate the land-based related non-point source problems. Regulations have been drafted to revise the earth change laws. These regulations are proposed through the Virgin Islands non-point source program.

	COMPLETION OF CZM §6217 NON-POINT SOURCE POLLUTION PLAN
American Samoa	The draft plan has been submitted and conditional approval has been granted by USEPA and NOAA.
Guam	September 30, 1998…however, this supposes a much more aggressive participation by Guam EPA than has been evidenced in the past.
Hawai'i	NOAA and EPA conditionally approved Hawaii's Coastal Nonpoint Pollution Control Program Management Plan in 19998. The State has five years to meet the conditions placed on the program by these Federal agencies.
Northern Mariana Islands	Draft was submitted in late 1994, and it received conditional approval from OCRM.
Puerto Rico	It was submitted and has been conditionally approved by NOAA and the EPA.
US Virgin Islands	V.I. will complete its non-point source program when the proposed regulations are implemented. We are hoping to have this completed in the very near future.

Monitoring and Research

INVENTORY AND DATABASE OF CORAL REEF SURVEYS AND MONITORING ACTIVITY

American Samoa	Database at DMWR ( ) and at FBNMS (1985).
Guam	The University of Guam Marine Laboratory has been surveying Guam's reefs for over 25 years and has documented this information in technical reports. Additionally, the Department of Agriculture has been monitoring coastal fishing effort and harvest for over 25 years. The Marine Laboratory has the most complete data on Guam's reefs but has not completed the island-wide assessment of Guam's reefs at any one time. They do, however, routinely conduct coral reef surveys around Guam which can be sued to assess the general health of coral reefs.
Hawai'i	Database of monitoring activity completed by a CRI volunteer, Jennifer Frederick, 1997.
Northern Mariana Islands	CRMO's Saipan Lagoon Use Management Plan was updated and contains baseline information on the lagoon's coral reefs and sea grass meadows. DEQ has created a Marine Monitoring Team that has been collecting and analyzing data on coral reef health. DEQ is working with NOAA's National Oceanographic Data Center to archive the database. WESTPAC produced a document this year that describes the coral reef resources of the CNMI.
Puerto Rico	No inventory or database.
US Virgin Islands	The National Park Service has an ongoing inventory and monitoring program within park controlled waters. In addition, the fish and wildlife division in the Department of Planning and Natural Resources and UVI conduct monitoring of reefs in the area.

COMPREHENSIVE ASSESSMENT OF CORAL REEF CONDITION

American Samoa	Yes, DMWR, FBNMS.
Guam	Yes. UOG Marine Lab in collaboration with GEPA, DAWR and CZM, through both professional assessment and citizen participation assessment over a 25 year period.
Hawai'i	Anecdotal assessment of Hawaii's corals was undertaken by coral reef scientists and volunteers based on community input. However, final results of this assessment were never published.
Northern Mariana Islands	DEQ, with assistance from DFW, NMC, and CRMO, formed a Marine Monitoring Team that has been observing the health of coral reefs. This is an ongoing program.
Puerto Rico	None.
US Virgin Islands	None.

	AGENCY REGULARLY MONITORING REEF
American Samoa	Yes. FBNMS, 18 sites on Tutuila, every three years.
Guam	Yes. OUG Marine Lab, DAWR, and GEPA monitor corals and reefs at numerous sites around Guam on a monthly, quarterly, and annual schedule.
Hawai'i	Various agencies monitor coral reefs on a regular basis including but not limited to University of Hawai'i scientists, Hawai'i Institute of Marine Biology, and DLNR.
Northern Mariana Islands	DEQ, with assistance from DFW, NMC, and CRMO, formed a Marine Monitoring Team that has been observing the health of coral reefs. This is an ongoing program.
Puerto Rico	DEQ collects water quality samples daily and analyzes samples for organics (bacteria, not metals). DEQ has formed a Marine Monitoring Team that monitors coral reef health year round.
US Virgin Islands	No agency is monitoring coral reefs as a long-term programmatic task. What we do have are several multiple personal initiatives by Professors, Students and Volunteers. The following are examples: • Individual professors and students monitor coral reefs at specific sites. • Dr. Jorge García- CARICOMP benthos and fish annually, Turrumote • Prof. Edwin Hernandez- Cordillera, Viequez and Culebra • Dr.Vance Vicente- Viequez, Culebra • Dr. Jack Morelock • Dr. Paul Yoshioko • Dr. Jorge Corredor

	HEALTH OF CORAL REEFS STUDIES
American Samoa	Yes. DMWR, 1994-1997, Dr. Alison Green.
Guam	Yes. UOG Marine Lab, DAWR, GEPA, GCMP over a twenty-five year period.
Hawai'i	Same as 1994. CRI community and scientist volunteers have completed anecdotal assessments of some of the islands in the past two years.
Northern Mariana Islands	DEQ has a Marine Monitoring Team. University of Guam and DFW staff conduct periodic research. Consultants who prepare EISs do the assessments.
Puerto Rico	Dr. Williams - Bleaching, coral diseases, urchin mortality.
US Virgin Islands	None identified.

	WATER QUALITY MONITORING
American Samoa	Yes. ASEPA.
Guam	Yes. GEPA and Guam Waterworks Authority (formerly PUAG) conduct a variety of test for fecal coliform and other bacteria, some nutrients, and turbidity. Some tests are conducted on a weekly basis (coliform), and others are conducted in conjunction with other opportunities.

Hawai‘i	Same as 1994.
Northern Mariana Islands	No changes.
Puerto Rico	JBNERR - Two years monitoring temperature, dissolve oxygen, salinity, turbidity, nutrients; EQB; Isla Magueyes, Marine Science Lab-Temperature
US Virgin Islands	No change.

Restoration, Rehabilitation, and Reseeding

CORAL REEF RESTORATION PROGRAM

American Samoa	No reseeding or restoration has been done.
Guam	Marine Lab will answer this in depth at the workshop. This is one of the current projects which has received funding.
Hawai‘i	Kaneohe Bay - US Fish and Wildlife Service, National Marine Fisheries and the Hawai‘i Institute of Marine Biology are doing studies on coral transplanting. • Kawaihae, Hawai‘i - USFW, USACOE, and DLNR/Division of Aquatic Resources are currently in the middle of a three year project to evaluate transplant techniques. • Kaho‘olawe - By 1990 the US Navy effectively eradicated goats from the island, which controlled land erosion and enabled conditions for regreening the island. The Kaho‘olawe Island Reserve Commission is in charge of revegetating the island, which should remove the stressor of sedimentation on corals, and allow the coral reefs to restore themselves.
Northern Mariana Islands	CRMMO and Corps permits require developers to move coral from dredging sites.
Puerto Rico	• DNER, Artificial Reefs for fish recruitment • Sea Grant-William & Austin, *Acropora cervicornis* transplantation. • Sea Grant-Austin, Reproductive Cycle of 25 coral species in Puerto Rico.
US Virgin Islands	No projects identified.

	CORAL BREEDING
American Samoa	No, American Samoa does not breed corals.
Guam	Yes, UOG Marine Lab is breeding coral.
Hawai'i	Research is ongoing at the University of Hawai'i, Waikiki Aquarium and Hawaii Institute of Marine Biology.
Northern Mariana Islands	No, CNMI does not breed corals.
Puerto Rico	No, not that has been done publicly.
US Virgin Islands	No public projects exist.

Education and Public Awareness

	GENERAL PUBLIC EDUCATION AND AWARENESS PROGRAMS TO PREVENT DEGRADATION
American Samoa	Various programs: DMWR, FBNMS, ASEPA and ASCMP.
Guam	"Man, Land, and Sea" (both a monthly television show and bi-monthly newsletter) • Dangerous Sea Creatures Poster, fish posters, DFW flyers (80 different with color photo and half page description). • Coral reef video • reef survey • Kids for Coral, science fairs, school • presentations • Earthweek displays • Marine Lab open house (Discovery Day) • pollution report press releases • speakers presentations to schools and community groups These efforts are aimed not only at preventing degrading of reefs, but at a wider understanding of the environment and the impacts of the human community on it, and the cost to the human community in a degraded environment.
Hawai'i	• Volunteers of the Hawai'i Coral Reef Network developed a Comprehensive Involvement and Outreach Plan. • Coral Reef Kids Kamp, Kauai. • Pacific Whale Foundation Fish Count. • Reef Check held on Hawai'i, Kaua'i, and Maui. • Reef Quest: An Underwater Safari through the Incredible World of the Reef (a series of interactive television programs broadcasted nationally via PBS). • QUEST classes at the University of Hawai'i, Hilo. • Teacher training workshops by the Waikiki Aquarium and the Pacific Whale Foundation.

	• Hoʻomalu i Ke Kai celebration, Oʻahu. • Sea Search, Exploring Tropical Marine Life, CD-ROM produced by Moanalua Gardens. • School visits, fairs, community events by various non-profit groups including the Waikiki Aquarium, Sea Life Park, Pacific Whale Foundation, the University of Hawaii, Hawaii Wildlife Fund, Save Our Seas, DLNR, the Department of Education, and CZM. • Others.
Northern Mariana Islands	CRM and DFW still have education programs. DEQ and CRM have conducted numerous activities over the past year, including a coral reef poster contest, essay contest, mural painting, Governor Proclamation, and newspaper releases.
Puerto Rico	There isn't a general public coral reef education program in Puerto Rico. • There are various marine education programs that within there objectives, are performing activities towards protection of Coral Reefs. Sea Grant, DNER, JBNERR, Department of Education, Private Non-profits, etc.
US Virgin Islands	No general public coral reef education programs exist currently.

	SPECIFIC PUBLIC EDUCATION AND AWARENESS PROGRAMS ABOUT LAWS AND REGULATIONS
American Samoa	DMWR, school outreach; FBNMS and various agencies, Fishermen's Workshop, 1994 (forum proposed for 1998).
Guam	Posters, flyers, activities booklets, strip film presentations, school visit program, television and radio public service spots.
Hawai'i	DLNR: Brochures on fishing regulations, "Coral and Live Rock Laws of Hawaii", Marine Life Conservation Districts, sea turtles, sharks, etc. Posters on reef fish, and coral laws. Staff distributes the brochures and posters at community events throughout the islands and in schools statewide.
Northern Mariana Islands	CRM and DFW still have education programs. DEQ and CRM have conducted numerous activities over the past year, including a coral reef poster contest, essay contest, mural painting, Governor Proclamation, and newspaper releases.
Puerto Rico	CRM and DEQ coordinate educational activities for Year of the Coral Reef.
US Virgin Islands	None.

	International Technical Assistance **CONTACT PERSON**
American Samoa	American Samoa is not involved in providing technical assistance for

	coral reef management internationally.
Guam	Scientists and resource managers from UOGML, DAWR, and GCMP have helped with coral reef issues in a number of other countries, including: Palau, Yap, Kosrae, Pohnpei, Chuuk, Saipan (CNMI), Ecuador (Galapagos Islands), Cook Islands. Contacts: Drs. Robert Richmond, Charles Birkeland, Gustov Paulay, Steve Nelson University of Guam Marine Laboratory, UOG Station, Mangilao, Guam 96923 Phone: 671-735-2176; Fax: 671-734-6767
Hawai'i	The Hawaii Coastal Zone Management Program, P.O. Box 2359, Honolulu, HI 96804. Phone: (808) 587-2883; Fax: 587-2899. International technical assistance is provided by scientists including, but not limited to, Dr. Rick Grigg, University of Hawaii
Northern Mariana Islands	John Furey, AAA 2852 Box 10001, 2nd Floor, Morgen Bldg., Saipan, MP 96950. Susan Burr, CNMI Division of Environmental Quality, Box 10007, Saipan, MP 96950. Susan heads DEQ's marine monitoring program.
Puerto Rico	Jobos Bay National Estuarine Research Reserve, Call Box B, Aquirre, Puerto Rico 00704. Phone: (787) 853-4617; Fax: (787) 853-4618.
US Virgin Islands	Both the National Park Service and the Eastern Caribbean Center at the University of the Virgin Islands provide technical assistance to other islands in the eastern Caribbean. The Research Division of the National Biological Survey at Virgin Islands National is involved. Contacts would be directly to the Superintendent at the Park, at UVI Eastern Caribbean, the contact is Dr. Henry Smith.

Other

PROGRAMS AND INITIATIVES TO MANAGE CORAL REEFS

American Samoa	DMWR, school outreach; FBNMS and various agencies, Fishermen's Workshop, 1994 (forum proposed for 1998). ASCMP is cooperating with other departments such as ASPA and ASEPA on the Paradise 20000 which is a joint venture to make American Samoa the cleanest islands in the South Pacific by the year 2000. The focus of the effort is litter which impacts the coral reef when improperly disposed of in the ocean.
Guam	Guam Coral Reef Initiative, adopted through Executive Order 97-10. Guam has adopted five marine preserves.
Hawai'i	Hawaii Coral Reef Initiative and DLNR.
Northern Mariana Islands	A new NGO called the Coral Reef Conservancy has been formed which has a mission of fostering community support for the protection of coral reefs. CRMO received $10K from OIA for Coral Reef Initiative projects, and CRMO used the money to purchase SCUBA equipment and to subsidize the production of a textbook on island ecology. DEQ is

	beginning a new project to identify sources of NPS pollution. DEQ Environmental Awareness Week and Earth Day activities; Interagency Watershed Planning Group.
Puerto Rico	A task has been incorporated in CZM for the development of a Coral Reef protection plan. JBNERR will be sponsoring a coral reef monitoring training to capacitate and implement standards in coral reef monitoring data collection.
US Virgin Islands	Programs started (some programs mentioned above) include designating marine protected areas, monitoring, statutes (non-point source pollution), and educational processes.

U.S. ISLANDS CORAL REEF INITIATIVE STRATEGY
CONTACT INFORMATION

US All Islands Coral Reef Initiative
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USAICRICC Related Websites

Federal

Protecting Coral Reefs: Building on the Year of the Ocean
President's Executive Order and US Coral Reef Task Force press releases and documents
http://CoralReef.gov/

Office of Insular Affairs, US Department of the Interior
http://www.doi.gov/oia

Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration
http://www.nos.noaa.gov/ocrm/czm

American Samoa

American Samoa Coastal Management Program
http://wave.nos.noaa.gov/ocrm/czm/czmamericansamoa.html

Fagatele Bay National Marine Sanctuary
http://wave.nos.noaa.gov/nmsp/FBNMS/html/Intro.html

Commonwealth of the Northern Mariana Islands

CNMI Coastal Resources Management Program
http://www.nos.noaa.gov/ocrm/czm/czmnorthernmarianas.html

CNMI Department of Environmental Quality
http://www.deq.gov.mp/

Guam

Guam Coastal Resources Management Program
http://www.nos.noaa.gov/ocrm/czm/czmguam.html

Hawai‘i

Division of Aquatic Resources, Hawaii State Department of Land and Natural Resources
http://www.state.hi.us/dlnr/dar/index.html

Hawaii Coastal Zone Management Program
http://www.nos.noaa.gov/ocrm/czm/czmhawaii.html (OCRM/NOAA website)
http://hawaii.gov/dbedt/czm/index.html (Home Page)

Hawaiian Islands Humpback Whale National Marine Sanctuary
http://wave.nos.noaa.gov/ocrm/nmsp/nmshawaiiislands.html

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USAICRICC Related Websites

Federal

Protecting Coral Reefs: Building on the Year of the Ocean
President's Executive Order and US Coral Reef Task Force press releases and documents
http://CoralReef.gov/

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http://wave.nos.noaa.gov/nmsp/FBNMS/html/Intro.html

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CNMI Department of Environmental Quality
http://www.deq.gov.mp/

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http://www.nos.noaa.gov/ocrm/czm/czmguam.html

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Hawaiian Islands Humpback Whale National Marine Sanctuary
http://wave.nos.noaa.gov/ocrm/nmsp/nmshawaiiislands.html

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Puerto Rico Coastal Management Program
http://www.nos.noaa.gov/ocrm/czm/czmpuertorico.html
Jobos Bay National Estuarine Research Reserve
http://www.nos.noaa.gov/ocrm/nerr/reserves/nerrjobos.html

US Virgin Islands

US Virgin Islands Coastal Zone Management Program
http://www.nos.noaa.gov/ocrm/czm/czmvirginislands.html