U.S. ISLANDS CORAL REEF INITIATIVE WORKSHOP

SUMMARY REPORT

MAUI, HAWAI'I
SEPTEMBER 25-26, 1997

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SUMMARY REPORT

Prepared for:

The United States Coral Reef Initiative

THE OFFICE OF INSULAR AFFAIRS,
UNITED STATES DEPARTMENT OF THE INTERIOR
and the
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT,
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Submitted by:

THE PACIFIC BASIN DEVELOPMENT COUNCIL
and the
SOCIAL SCIENCE RESEARCH INSTITUTE,
UNIVERSITY OF HAWAI'I AT MĀNOA

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ACKNOWLEDGMENTS

The Pacific Basin Development Council would like to extend our thanks to all of the participants of the U.S. Islands Coral Reef Initiative Workshop. We appreciate the time you took from your busy schedules to discuss and plan future activities which will ensure the preservation of one of our most precious island resources--- coral reef ecosystems.

We appreciate the cooperative efforts of Nancy Boone-Fanning in the Office of Insular Affairs, U.S. Department of the Interior and Dr. Michael Crosby at the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration in sponsoring the workshop and providing financial and informational resources for the participants.

The reports on the status of local coral reef initiative efforts and on the projects and activities to achieve the objectives of these regional plans show the enthusiasm, creativity, and commitment of the participants for the International Coral Reef Initiative. We encourage you to continue the collaboration fostered by this workshop as you engage in additional coral reef ecosystem management activities. Mahalo for your participation in the workshop and your extensive work in your islands.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The U.S. Islands Coral Reef Initiative Workshop was held on Maui the 25th and 26th September 1997, following the annual Pacific Coastal Zone Management Conference. During the first session, coastal managers and principal investigators for coral reef projects from American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, Hawai'i, Puerto Rico, and the U.S. Virgin Islands met with federal agency representatives to discuss the current status of the Coral Reef Initiative and to explore future directions for improving the management of coral ecosystems.

The meeting opened with a short visioning exercise in which participants were asked to describe their vision for coral reef ecosystems and management systems over the next five years. They were also asked to identify the types of actions that should be undertaken to achieve their vision. Participants from the American Flag Pacific Islands had engaged in this exercise previously, in December 1994, as they developed a regional coral reef initiative plan for their islands in response to the U.S. Coral Reef Initiative. Puerto Rico and the U.S. Virgin Islands participated in the development of regional initiatives in similar workshops for the Atlantic Gulf States. This year, the U.S. Islands, from the Pacific and Atlantic Oceans, have joined in an "island region" to more appropriately deal with specific needs of implementing the Coral Reef Initiative.

Following the regional workshops three years ago, participants returned to their local jurisdictions to promote the regional Coral Reef Initiative among numerous local agencies. The points of contact met regularly with several key agencies and local coral reef specialists to determine a strategy for achieving the objectives of the regional Coral Reef Initiative. Participants in these meetings included coastal zone and environmental managers, academic researchers, non-profit organizations, educators from elementary to university levels, government representatives, and local volunteers. These local experts worked to expand efforts on each of the islands through education and the development of community-based and sector-specific programs. The status report from each island, which appears later in this report, specifies the changes and progress made over the past three years in coral reef management.

At this workshop, consideration of future coral reef ecosystems and management extended the ongoing process of local coral reef initiative planning, and enabled workshop participants to formulate additional ideas for updating their regional plans and

developing activities that would facilitate achievement of their shared visions. Several weeks prior to attending the workshop, organizers sent questionnaires concerning the status of current coral reef programs and of future plans. The points of contact consulted their coral reef initiative planning groups with these questions before attending the workshop; therefore, the information they presented at the workshop, and the information contained within this report, represents the accumulation of knowledge from local people working with various aspects of local coral reef initiative implementation.

By the close of the workshop, participants had provided overviews on the status of projects and programs of their local coral reef initiatives. An interactive planning process elicited suggestions for future projects and reexamined goals for the coral reef initiative. Participants also refined a mission statement and discussed collaboration among the U.S. Islands from the Pacific region and from the Caribbean. In one and a half days of intensive discussions, participants increased their commitment to the International Coral Reef Initiative.

STATUS OF CORAL REEF INITIATIVE PLANS AND PROJECTS

The overviews of local coral reef initiatives presented by each island government demonstrated their commitment to the initiative through improvements in management which protect and enhance the health of their coral reefs. During the Year of the Reef, public awareness increased significantly and projects gained support from public agencies, private organizations, and community groups.

In order to meet the coral reef initiative objectives in each of the jurisdictions participating in the workshop, the Office of Ocean and Coastal Resource Management (OCRM), National Oceanic and Atmospheric Administration (NOAA) and the Office of Insular Affairs (OIA), United States Department of the Interior (DOI) provided funding for projects to assist the islands in coral reef management. The principal investigators of projects from all of the islands described their projects and outlined benefits to their coral reefs. (Brief abstracts appear in the appendix section of this document).

Discussions on the first day increased the awareness among workshop participants of coral reef management activities occurring throughout the U.S. islands. Several principal investigators offered technical assistance to coastal managers. Such assistance included linking descriptions of coral reef activities through a web page where new findings and research and innovative activities could be posted and providing film and transcripts from a video project which could be borrowed and translated into local languages. Participants encouraged each other to engage in collaborative projects.

STRATEGIC PLANNING SESSION

The second day was devoted to a planning session to identify opportunities for new local Coral Reef Initiative activities. Through an interactive working session, participants developed and prioritized projects for future funding. These projects appear in detail in the next section of this document. The summary is as follows:

American Samoa:

1) Scientific Research and Monitoring
   * CRI Invitational Workshop
   * Sedimentation Study
   * Monitoring of Coastal Development Projects
   * Recruitment of Hard Corals
   * Recruitment of Key Reef Fishes
   * Recovery of Coral Reef from Large Perturbations
2) Education and Public Awareness
   * The Envirobus
3) Legislative and Legal Review

Commonwealth of the Northern Mariana Islands:

1) Marine Science degree program at the Northern Marianas College
2) Improve capabilities of CNMI Marine Monitoring Team
3) Inventory CNMI's Coral Reefs
4) Identify and Remediate Contaminated Sites
5) Inventory CNMI's Seagrass Beds and Study Fish Habitat Functions
6) Establish Marine Protected Areas
7) Implement Best Management Practices for Non-Point Source Pollution
8) Add Coral Reef Inventory to GIS
9) Educational Video on Coral Reefs
10) Research Nutrient Flux to Ecosystem Dynamics on Reefs
11) Study Threat and Predict Impacts from Global Warming

Guam:

1) Reef Restoration, Phase II on Coral Recruitment Study
2) Reef Restoration, Phase II Expansion
3) Education: "Village to Village Education Road Show"
4) Education: "Encouragement of Youth and Development of Youth Groups"
5) Education: "Coral CD"
6) Education: "Signage"
7) Baseline Information: Survey Reef Areas
8) Reef Restoration Monitoring Network
9) Baseline Information: Coral Reef Atlas
10) Reef Restoration: Update 1970s Baseline Studies
11) Reef Restoration: Study of Recreational Impacts on Diminishing Fish Stocks
12) Resolve Jurisdictional Differences

Hawai'i:

1) Education, Communication, and Outreach
   * Expansion of Coral Reef Network Internet
   * Educational Video
   * Coral Reef Initiative Newsletter
   * Educational Display
2) Monitoring Program
   * Monitoring Workshop
   * Monitoring of Coral Reef Ecosystems
3) Baseline Information and Research
   * Variety of Research Projects

Puerto Rico:

1) Baseline Characterization
2) Capacitation of Personnel
3) Coral Reef Monitoring Program
4) Education and Outreach Programs

U.S. Virgin Islands:

1) Education & Public Awareness
   * Training for Marine Environment Teachers
   * Training for Workers in Visitor Industry
2) Baseline Information and Research
   * GIS for Reefs and Development
3) Reef Reseeding and Restoration
4) Training and Equipment
   * Training for Environmental Officers
5) Monitoring
6) Reef Reseeding and Restoration
   * Study Impacts of Recreational Activities on Declining Fish Stocks

MANAGEMENT ISSUES AND OPTIONS

The final session of the workshop was devoted to discussion of critical issues which emerged throughout the workshop. After discussing several major problems, participants identified potential solutions and agreed on what could be done to resolve conflicts which could impede the further development of local coral reef initiative objectives.

A summary of the highlights from the discussion follow:

1) NOAA funding mechanism for Coral Reef Initiative projects:
   * Matching Fund Requirements
     Finding local matches for federal funding can be difficult. At funding levels less than $200,000, federal agencies cannot require matches in US territories and commonwealths, and this must be expressed in writing to the Fish and Wildlife Foundation.
   * Bureaucratic Inefficiency at the Fish and Wildlife Foundation
     Funding for Coral Reef Initiative project approved months ago had not been received by grantees. Projects which had obtained additional funding from other sources were in progress, but those which were dependent on the funds from the Foundation had not been able to proceed. Participants agreed that future funding should not be made through the Fish and Wildlife Foundation.
   * Letter to Dr. Baker from the Governors
     A letter written from governors may be the best and most effective means of facilitating the funding of Coral Reef Initiative projects directly from the Office of Ocean and Coastal Resource Management.

2) Army Corps of Engineers (USACOE)
   * Responsibility at Federal level for coral reefs is fragmented. Currently, the Environmental Protection Agency, the Fish and Wildlife Service, National Marine Fisheries Service, and the Office of Ocean and Coastal Resource Management have responsibility for coral reef management. US Federal law fails to protect reefs because each of these agencies has specific mandates which affect coral reefs, but they are not solely focused on coral reef management.
   * Information on the jurisdictional responsibilities for coral reef management will be pulled together by Jerry Norris and forwarded to the Points of Contact.
   * Proposed solutions: Amend existing legislation to consolidate or rationalize coral reef management responsibility or write new legislation.

3) Environmental Impact State/Environmental Impact Assessment EIS/EIA Process
   The EIS/EIA process should involve feedback, reevaluation, and long-term commitments.
   * Content: marine component needs to be required;
   * Qualifications/Disqualification/Malpractice of EIS Consultants:
     People who qualify as experts to evaluate impacts to coral reefs should have a measured level of professional competence. Individuals conducting EISs or EIAs which identify no major impact result and unidentified impacts occur as a result of the projects assessed should be disqualified from future work or held accountable on the grounds of malpractice, especially for consultants who perform these evaluations at high prices.

4) Water Quality/Substratum Quality Need to Be Included in EIS/EAs
   * Non-point Source pollution effects must be included;
   * Pesticide use must be evaluated
   * Scientists should establish protocols for testing water quality.

5) Environmental Damage, Liability and Mitigation
   Assessment and valuation of reef needs to be developed in order to recover damage to reefs and reef habitats. For example, if a shipwreck occurs on a coral reef, what is the damage to the reef?
   * Need to assess liability.
   * Bonds should be required for people and boats working in these waters.
   * Establish appropriate funds and accounts for coral reef mitigation, restoration, and education.
   * Actions should be culturally and environmentally appropriate.
   * Currently, coral reefs are "a hazard to navigation" and this view needs to be changed. There should be umbrella legislation for coral reefs which recognizes reefs as resources.
   * The Magnuson Act has NMFS review anything affecting fish habitat, and since coral reefs are essential to fish habitat, this does provide some protection for reefs.

6) Essential habitat designation with consultation from the Coastal Zone Management programs.
   * Problem: current top-down management fails to protect habitats.
   * "Essential" designation should be provided in areas of spawning, as well as in areas where the adult of the species live.
   * Currently, all habitat should be designated as "essential" because research has not been done extensively.

7) Involvement of Freely Associated States (FAS)
   These islands have expressed interest in the Coral Reef Initiative.
   * Must be clear about activities which include the FSM and other states
   * Clarify protocol for who contacts the freely associated states
   * Share and coordinate information among the U.S. Islands, then send documents to the FAS
   * New web page: Brian Tissot and Mike Hamnett will discuss options for preparing a network on the web to include FAS

8) Other sources of Funding
   Bob Richmond developed a list of funding opportunities from private foundations for coral reef projects, which he will share with the other islands.

9) Organizational Issues
   * Federal participation - need to build interest in the Congress.
   * Pool of coral reef scientists to work in the region- cleaning house.
   * Determine a funding program.
   * Refer to this group as the U.S. Islands Coral Reef Initiative.

FUTURE STEPS IN THE U.S. ISLANDS CORAL REEF INITIATIVE

The summary report for the U.S. Islands Coral Reef Initiative Workshop will be used to express regional interest in coral reef management in support of national and international objectives. The projects detailed in the next section will be submitted as a funding package to national agencies to gain support for project implementation. The islands will network and submit these proposals to private foundations and organizations to meet any additional funding needs. These additional efforts will be coordinated by the points of contact for each of the island jurisdictions.

The regional and local managers will continue to develop projects and reassess their current efforts. Project managers have become familiar with lessons learned for application to future programs, as additional funding becomes available. The initiative is envisioned as an ongoing process, evolving to meet the needs of the islands and their coral reef ecosystems.

PROPOSED PROJECTS AND PROGRAMS

AMERICAN SAMOA
CORAL REEF INITIATIVE: 1998-2002

INTRODUCTION

The American Samoa Coral Reef Initiative Task Force has developed a plan of action for the Territory for the next four years. Included in the plan are scientific research and monitoring proposals, a planning component, an education project, and a plan for a legal review with the aim to modify or introduce coral reef legislation. This project package would enable us to continue the work we have begun in the past five years developing an understanding of the processes and impacts that face our coral reef resources, and to tackle the human issues of public education/awareness and regulation. Though by no means viewed as complete and comprehensive, the projects will at least provide a significant movement forward in our efforts to protect and maintain our coral reef resources. Although this is presented as a package, the projects are listed in order of priority.

SCIENTIFIC RESEARCH AND MONITORING

The Impact of Reef Degradation on Coral Reef Ecosystems

Background: Recent studies (Birkeland et. al. 1996, Green et. al. 1996, Green and Birkeland, in press) have shown that the coral reefs of American Samoa are in a delicate state of recovery from severe perturbations. Coral cover is low at most sites around Tutuila particularly those that have poor water quality (i.e. high sediment loads). The fish species richness and density varied from place to place. Species richness and density increase as a function of depth with reduced suspended matter and better water exchange rates. There is evidence to suggest that degraded reef habitats leads to decline in fish populations. One of the potential threats to the reefs of Tutuila is the increase in human population and associated impacts, including overfishing. It is one aim of our CRI Task Force to determine the impacts of habitat destruction, degradation and pollution on fish populations and marine ecosystems, and to select actions to encourage the conservation and enhancement of coral reefs and associated fishery resources. We recognize that an assessment of the coastal waters and reef areas necessary to fish for spawning, breeding, feeding or growth to maturity is needed. Such an assessment would identify, describe and quantify terrestrial and aquatic sources and forms of degradation detrimental to these essential fish habitats.

Evaluative criteria of coral reef related fish densities, growth, reproduction and survival rate within reef types, production rates by reef types, baseline information on the types of degradation detrimental to the reefs as habitats hence the associated marine resources are the types of baseline information needed. Results from an assessment would be used to verify threats to coral reefs and associated fishery resources and would recommend measures to minimize these threats. We recognize that the scope of the questions we are asking goes well beyond a two to four year research program. We have distilled some of the issues to discrete problems that we feel address the larger questions posed above. They will provide another series of steps toward the our understanding of our coral reef. The Task Force is proposing six scientific projects to be completed in the next 2-4 years. We would like to begin our project cycle with a workshop that will allow us to gain clarity on the coral reef issues we have here, and how they will best be approached through our proposed projects. Although we do not anticipate that our projects will change radically, we do expect that there to be shifts in priorities and approaches to the issues as proposed here, as an outcome of the workshop.

Project #1: CRI Invitational Workshop

We propose to sponsor a scientific planning/information gathering/status of coral reef research and monitoring workshop to enable American Samoa to formulate realistic scientific studies and management strategies to protect, monitor and restore reef health. This workshop could be broadened to include other regional entities. The expected outcome would be a completed five-year scientific research and monitoring plan.

Lead agencies: Department of Commerce, Department of Marine and Wildlife Resources, American Samoa Environmental Protection Agency

Project Outline:

We would like to hold a workshop inviting coral reef specialists from the Pacific region. The workshop will feature information exchange regarding the current state of knowledge about coral reef processes and effects of impact, a discussion of Samoa's coral reefs, and a session that would plan the scientific research and monitoring needs of Samoa for the next five years. The expected outcome of this workshop a five year research and monitoring plan.

Budget

Invitational travel, honoraria, and per diem for 5 specialists	$15,000
Venue costs for 3-day workshop	300
Breakfast/lunches for 35 participants	1,000
Report printing	500
TOTAL	**$16,800**

In-Kind contributions from the lead agencies would include staff time in preparation and hosting of the conference and vehicle use.

Project #2: Sedimentation Study

Sedimentation flowing onto coral reefs has been identified as a major issue in American Samoa. Heavy rain events bring tons of sediment onto the reefs in American Samoa. Heavy rain events bring tons of sediment onto the reefs in many of the watersheds. We have little data on the sediment sources, composition, loads, and the load changes over time (on a daily basis, and over several years). Sediments may carry pesticides and other agricultural pollutants as well as sewage and piggery wastes, further compromising the water quality. A comprehensive study of the sediment problem could embrace several discrete projects. (ASEPA is currently engaged in looking at land-based sources and loads.)

Project Outline

A study of this nature will require coordination between the Environmental Protection Agency, the Department of Marine and Wildlife Resources and the Coastal Management Program. Other players might include the National Park of American Samoa and the Fagatele Bay National Marine Sanctuary. We first need to assess what data we already have and are collecting. We would commit at least three years to the project. Sampling regimes should be set up by a scientist who has first analyzed the information already collected and who designs the program based on that information.

Lead agencies: Department of Marine and Wildlife Resources, American Samoa Environmental Protection Agency

Budget

Cost would include hiring and training of local staff (a technician who would be responsible for maintenance of field stations, collection and analysis of data, and data reporting), and equipment purchases, including a vehicle for site visits.

Year 1	
Contract with scientist for initial assessment, project design and technician training; includes travel, per diem, salary for one month.	$10,000
Technician (half time for this project)	6,000
Equipment (lab setup, field equipment)	5,000
Vehicle	15,000
Misc. (supplies, communications, fuel, rentals, off-island analyses, etc.)	5,000
Indirect Costs	1,600
Year 1 TOTAL	**42,600**
Year 2	
Assessment trip by	4,000
Technician salary	10,000
Misc	3,000
Indirect Costs	1,000
Second Year TOTAL	**18,000**

Year 3

Assessment trip by PI, final report preparation, recommendations	5,000
Technician salary	10,000
Misc.	2,000
Indirect Costs	1,000
Third Year TOTAL	**18,000**
TOTAL FOR THREE YEARS	**$78,600**

Project #3: Monitoring of Coastal Development Projects

There has been little study on the effects of coastal development on the coral reefs adjacent to the projects, both during and after the projects are completed. Consequently, planners and project reviewers (for permits) have no way of verifying the effectiveness of their recommendations and conditions. Information obtained from monitoring water quality, sedimentation rates, coral community changes, mortality and recovery would aid planning for future project reviews. Project will be run by the Department of Marine and Wildlife Resources in cooperation with the PNRS.

Project Outline

Choose 4-6 projects that will impact coastal areas, with particular attention to areas with coral reefs. If possible, the reef survey would take place before the project begins. The survey should include an inventory of the coral community including corals, other invertebrates, fish, marine plants. Selection of study sites at each project should take into account the position of the project, near shore currents, particularly sensitive species/ communities, and, if there, the 'ava. Surveys would be repeated throughout the project term and would continue through any recovery time unless there was no significant injury to the resources. Projects should be selected to demonstrate the wide variety of types of coastal development. Compliance with project conditions will also be closely monitored. The final report will assess the effectiveness of recommendations and conditioning of permits.

Lead Agency: Department of Marine and Wildlife Resources and the PNRS.

Budget

Year 1

Scientist contract salary	40,000
Technician (field assistant, 1/4 time)	3,000
Equipment	5,000
Misc.	3,000
Indirect Costs	4,000
First Year TOTAL	**59,000**

Year 2-4

Scientist salary ($40k/yr for 3 years)	120,000
Technician	12,000
Misc.	6,000
Indirect Costs	13,000
2-4 Year TOTAL	**151,000**
TOTAL	**$210,000**

Note: Projects 4 and 5 should be combined with one project lead scientist.

Project #4: Recruitment of Hard Corals

Scleractinian corals, along with other calcium carbonate reef builders, are the most prominent members of the Samoan reef communities. Two decades of severe and repeated perturbations, both natural and anthropomorphic, have kept coral cover at relatively low percentages. Sedimentation and poor water quality are factors that can impact the reproduction and recruitment of coral onto the reef substrate, further delaying any increase in coral cover, and possibly leading to a reduction in diversity due to the relative abilities of coral species to cope with habitat conditions. A study of the recruitment rates of corals would allow us to determine how they are faring. The data obtained would also contribute to decision making for resource managers who make decisions about coastal development.

Project Outline

Coral spawning occurs during the spring months in American Samoa (Sept.-Oct.). A coral scientist would set up a study to correlate spawning and reproductive success with water conditions and recruitment rates. This could be a half-time project for a coral scientist hired by DMWR for other projects (?).

Lead Agency: Department of Marine and Wildlife Resources

Budget

Year 1

Scientist salary (1/2 time)	20,000
Technician assistant (1/4 time)	3,000
Equipment	5,000
Misc.	2,000
Indirect Costs	2,000
Total for Year 1	**32,000**

Year 2

Scientist	20,000
Technician	3,000
Misc.	1,000
Indirect Costs	2,000
Total for Year 2	**26,000**
TOTAL	**$58,000**

Project #5: Recruitment of Key Reef Fishes

The reef artisanal fisheries in American Samoa are an important economic factor in the lives of many people. Although the Department of Marine and Wildlife Resources examines the end product by surveying the local fish markets, there has been only one study (Green, 1996) looking at recruitment of reef fishes. The data obtained would also contribute to decision making for resource managers who make decisions about coastal development.

Project Outline

A coral reef fish biologist would monitor recruitment of key reef fishes over a two year period. Sites selection would be based on water quality and sedimentation indications. This could be a half-time project for a coral scientist hired by DMWR for other projects.

Lead Agency: Department of Marine and Wildife Resources.

Budget

Year 1	
Scientist salary (1/2 time)	20,000
Technician assistant (1/4 time)	3,000
Equipment	5,000
Misc.	2,000
Indirect Costs	2,000
Total for Year 1	**32,000**
Year 2	
Scientist	20,000
Technician	3,000
Misc.	1,000
Indirect Costs	2,000
Total for Year 2	**26,000**
TOTAL	**$58,000**

Project #6: Recovery of the Coral Reef From Large Perturbations

As discussed above, the coral reefs of American Samoa are in recovery from several severe perturbations which caused drastic reductions in coral densities and cover, and reduced the general complexity of the reef environment. There has been only one longitudinal study of the reefs, fishes, invertebrates and marine plants, which has survey points in 1985, 1988 and 1995. Another iteration is due in the summer of 1998. The data from the first three surveys were compiled and reported on in 1997 (Green and Birkeland, in press). These studies need to continue as they are now not only important to Samoa, but to the reef scientific community in general because there are so few long term studies of this type. FBNMS plans to support this survey next summer, but is yet unsure of its funding.

Project Outline
A team from the University of Guam would repeat the surveys they have completed over the past 13 years. Data will be added to the analysis in the Green and Birkeland paper.

Lead Agencies: Fagatele Bay National Marine Sanctuary, Department of Marine and Wildlife Resources.

Budget
This project has been proposed in the annual budget Fagatele Bay NMS. However, funding may not approved.

June and July, 1998

Travel and per diem for five scientists (two coral biologists, one fish biologist, an invertebrate and marine plant biologist, three weeks)	25,000
Data analysis	3,000
Misc.	2,000
TOTAL	**$30,000**

EDUCATION AND PUBLIC AWARENESS
The Envirobus

Environmental education programs in American Samoa have been conducted over the past years by several government agencies and private organizations. There have been some coordinated efforts in the past and recently there was movement to have the environmental education programs more closely aligned.

This has been achieved through the formation of Le Tausagi, a group of all the environmental educators representing most of the government agencies with environmental messages. Le Tausagi has enjoyed a successful two years and has developed a 5-year plan.

Le Tausagi recognize that one of the major education targets is village outreach. Almost all agencies have some village outreach programs, but given the small size of most education divisions within the agencies, dedicated village outreach is just not possible. A joint village outreach environmental education campaign, would make it possible to cover themes that would address each agency's agenda.

At an inter-agency meeting that included the local environmental NGO, it was suggested that one approach to village outreach would be through a coordinated program utilizing one dedicated staff member and several interns (Americorps) and volunteers who would conduct entertaining and informative village visits. The heart of the program would be a traveling "Envirobus."

Project Outline
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 and spend Friday-Saturday (or whatever day combination would best suit the village) there. 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 should be opportunities for the villagers to participate in activities, too (reef/forest walks, guided snorkeling tours, artwork, etc.). The EnviroBus would plan one full circuit of Tutuila in two years. It may even be possible to take the bus to Manu'a for several weeks. This way virtually every person in American Samoa could participate in the program. The EnviroBus would also be available for Coastweeks, ReefWeeks, Earth Day and other coordinated environmental theme programs.

Lead Agency: Fagatele Bay National Marine Sanctuary and Le Tausagi.

Budget

Year 1	
EnviroBus coordinator	21,000
Intern (full-time)	12,000
Materials and Supplies	12,000
Advertising/printing	2,500
Maintenance and fuel	2,000
Bus (purchase, paint job, refit, see below)	35,000
Equipment	1,500
Indirect Costs	3,200
Year 1 Total	**89,200**
Year 2	
EnviroBus coordinator 21,000	
Intern (full-time) 12,000	
Materials and Supplies 5,000	
Advertising/printing	2,500
Maintenance and fuel	2,000
Indirect Costs	3,200
Year 2 Total	**45,700**
TOTAL	**$134,900**
Inkind ASG contribution	
Americorps interns (2)	16,000
Training	
Office space	
Legislative and Legal Review	

The environmental protection and conservation legislation and regulations for the Territory comprise both federal and Territorial authorities scattered over different agencies such as NOAA, Fish and Wildlife Service and EPA for federal regulations, and the various ASG departments for local regulations. This results in an often confusing array of laws and blurred responsibilities. In addition, there is a perceived need for strengthening of legislation and regulation directly relating to coral reef resource

conservation and management. We propose to hire an attorney to review and compile the current legislation and regulations, and to develop a succinct guide that can be used by the agencies. In addition, we would require this person to recommend, and eventually draft additional language to support our coral reef conservation efforts. We anticipate the work being concluded in six months, which the attorney dedicated full-time to this project.

Lead Agency: Attorney General's Office (collaborates with all the resource management agencies)

Budget	
Attorney (6 months @ $40,000/yr)	20,000
Printing 500misc.	1,000
Indirect costs	2,000
TOTAL	**23,500**

Cost Summary for all CRI proposals

Scientific Research and Monitoring CRI Invitational Workshop	$16,800
Sedimentation Study	78,600
Monitoring of Coastal Development Projects	210,000
Recruitment of Hard Corals	58,000
Recruitment of Key Reef Fishes	58,000
Recovery of the Coral Reef From Large Perturbations	30,000
Education and Public Awareness	134,900
Legislative and Legal Review	23,500
GRAND TOTAL	**$609,800**

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS CORAL REEF INITIATIVE PROJECTS AND PROGRAMS

29 September 1997
Prepared by Eric Gilman, Special Assistant to the Governor for Environment; and
Manuel C. Sablan, Administrator, Coastal Resources Management Office

HIGH PRIORITY PROJECTS

1) **Marine Science Program Development**

(a) Conduct a feasibility and planning project to identify requisite resources to establish a new two-year associates degree program in Marine Science at the Northern Marianas College. Cost: **One year--$30,000.**

(b) Establish and manage the new Marine Science program. Cost: **One year to establish $200,000;** In perpetuity management costs.

2) **Improve Capabilities of CNMI Marine Monitoring Team**

Bolster the data collection and analysis capabilities of the existing CNMI Marine Monitoring Team. This requires training in database management and data analysis, training in monitoring techniques, and funding for equipment.
Cost: **One year: $35,000.**

3) **Inventory CNMI's Coral Reefs**

Inventory all of the CNMI's coral reefs using both remote sensing and site visits.
Cost: **$150,000.**

4) **Identify and Remediate Contaminated Sites**

Locate contaminated coastal and marine sites, type of contamination, source of contamination, degree of contamination, and develop remediation plans. Test coastal sediments for contaminants in areas of concern (mainly in Saipan's lagoon). Design sampling and analysis plans, quality assurance/quality control plans, and analyze results. For instance, Saipan's dump, a site that has been issued an Administrative Order from the EPA for violating the Clean Water Act due to unauthorized

discharges into waters of the U.S., will be closed and remediated in the next two years. No one has analyzed the sediment adjacent to the dump. The dump allegedly contains munitions and other hazardous materials from World War II. Many people swim, fish, and glean invertebrates in the waters next to the dump, and there are numerous dredging projects in the vicinity of this known source of hazardous toxins. Cost: **$25,000.**

5) **Inventory CNMI's Seagrass Beds and Study Fish Habitat Functions**

Inventory the CNMI's seagrass beds and study seagrass meadows' performance of fish habitat functions. Two-year study costs: **$50,000.**

MEDIUM PRIORITY

6) **Establish Marine Protected Areas**

Establish marine protected areas on Saipan, Tinian, and Rota. Entails forming steering committees composed of representatives of interest groups, defining purposes of protecting areas, selecting sites, legally designating sites, preparing and implementing management plans, conducting monitoring and maintenance activities, and conducting education and enforcement. Two year project costs: **$80,000.**

7) **Implement Best Management Practices for Non-Point Source Pollution**

(a) Implement best management practices identified in the CRMO NPS CZMA §6217 plan, to minimize non point sources of pollution. One year costs: **$50,000.**

(b) What are the sources and fates of diffuse inputs, what adverse impacts do these non point sources of pollution cause, and what practices can minimize these adverse impacts? Basic research needs to be done to determine sedimentation processes in the CNMI and to determine if once a coral reef is stressed from a high rate of sedimentation, if the reef can recover if the sediment source is eliminated.

8) **Add Coral Reef Inventory to GIS**

Bolster CRMO's existing GIS program by adding coral reef inventory data layers. A GIS needs to be improved and maintained for the CNMI that will allow agencies to monitor cumulative adverse impacts (especially NPS pollution) to specific watersheds from development. One year project costs: **$30,000.**

LOW PRIORITY

9) **Educational Video on Coral Reefs**

Produce and distribute an educational video on coral reefs. One year project costs: **$25,000.**

10) **Research Nutrient Flux to Ecosystem Dynamics on Reefs**

Are nutrient inputs adversely impacting our coral reefs? What are the sources of the nutrients, and how do we remedy the problem? How does nutrient flux affect ecosystem dynamics. The input of nutrients to coastal areas is one of the highest priority issues the CNMI must address. Coral animals are very sensitive to nutrient fluxes and will deteriorate from eutrophication. If the reef is unhealthy, all coastal systems are adversely impacted. The CNMI needs long-term monitoring and research programs in order to relate nutrient flux to ecosystem dynamics. Seed money could be used to purchase in situ continuous water quality data recorders to monitor nutrient concentration trends. One year project costs: **$20,000.**

11) **Global Warming Impact Study**

Is global warming a threat to the CNMI's coral reefs, and is sea level rise a threat to our coastal development? What are the trends in ocean and air temperatures and relative and global sea level rise rates? Continuous monitoring of temperature is needed to monitor for effects of global warming. The CNMI would purchase an *in situ* continuous temperature/salinity probe to monitor temperature and salinity. One year project costs: **$30,000.**

GUAM CORAL REEF INITIATIVE PROJECTS AND PROGRAMS

The following projects appear in the order of priority:

1) **Reef Restoration**

Phase II on coral recruitment study. Expanding study to second year, in El Niño, to better understand whether first year results are consistent over time. **$8,000** ($25,000 would be better)- UOG Marine Lab, Birkeland.

2) **Reef Restoration**

Phase II of year one project - expand to other reef areas for greater sampling variability - **$5,000** ($25,000 would be better) - UOG Marine Lab, Richmond.

3) **Education: "Village to Village Education Road Show"**

Purchase multimedia equipment and develop printed materials for presentation in village meetings, particularly in small, more traditional villages where daily utilization (both passive & active) and reliance on reef is strongest. Includes development of program and, if allowable, inclusion of soft drinks for those attending. Developed for 10 villages. Concentration on reef function, geology, health, stresses, best practices. Aimed at 16 years old and older. **$10,000** ($20,000 would be better) - Department of Agriculture, Gerry Davis.

4) **Education: "Encouragement of Youth and Development of Youth Groups"**

Provide incentive materials for focusing science fair projects on coral reefs. Also for developing printed materials on putting together youth organizations focused on environmental awareness in general, and coral reef management in particular. **$12,000** ($20,000 would be better) - Kids for Coral, Janette Deagle.

5) **Education: "Coral CD"**

Development and production of coral reef education CD-ROM, for distribution to all schools and decision-makers, to be developed by a consortium of government agencies and Kids for Coral. **$20,000** ($30,000 would be better) - Guam Coastal Zone Management Program, University of Guam Marine Lab, Guam Environmental Protection Agency, Department of Agriculture, Kids for Coral, Mike Ham.

6) **Education: "Signage"**

Development and placement of interpretive/educational signs for reefs - both shoreside and underwater along developed trails or near particular resources. **$60,000** - Department of Agriculture, Gerry Davis.

7) **Baseline Information**

Undertake baseline survey of reef areas expected to be impacted (increasingly) - particularly in National Park reef area, prior to use expansion. **$40,000** - National Park Service/University of Guam Marine Lab, UOGML as lead.

8) **Reef Restoration**

Develop monitoring network of community/agency/scientists for regular reef check-ups. Include data base maintenance. **$20,000** - University of Guam Marine Lab.

9) **Baseline Information**

Develop a detailed coral reef atlas to reflect current conditions on 119 miles of coastline. **$200,000** - University of Guam Marine Lab and the Department of Agriculture.

10) **Reef Restoration**

Update seagrass and other resource baseline studies from 1970s. These studies were comprehensive, but independent from each other and formed the basis for the Guam CZM program. $370,000 - University of Guam Marine Lab, Department of Agriculture, Guam Environmental Protection Agency, Guam Coastal Management Program, and the Community.

11) **Reef Restoration**

Study of recreational impacts on diminishing fish stocks, including the impacts of sun screen, jet skis, etc. $25,000 - Department of Agriculture, University of Guam Marine Lab, and the Department of Parks and Recreation.

12) **Other**

Resolve jurisdictional differences. *Ex.* Hawai'i's archipelagic water, CNMI's Exclusive Economic Zone, and Guam's Exclusive Economic Zone.

HAWAI'I STATE CORAL REEF INITIATIVE

The following projects appear in the order of priority:

1) Education, Communication and Outreach

A Comprehensive Involvement and Outreach Plan was recently developed by members of the Hawai'i Coral Reef Network. This plan was compiled from discussions with educators, scientists and volunteers at community meetings, held throughout the State during the past two years. The Plan details activities that target specific groups to meet their needs, i.e. tourists, residents, ocean recreation business, etc. Listed below are some of the projects requested at the meetings:

a) **Expansion of the Coral Reef Network Internet**

This project is currently awaiting funding from the 1996 local-level Coral Reef Initiative Program (a partnership between the National Fish and Wildlife Foundation, the Department of Interior Office of Insular Affairs, the National Oceanic Atmospheric Administration's Coastal Services Center and the Office of Ocean and Coastal Resource Management). This web page is 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. Recently, it was requested that the site be expanded to include the efforts of the American Flag Pacific Islands and the Caribbean Islands. The main server would also house the web pages for some of these individual island jurisdictions. This will require additional financial support for supplies, equipment and student help.

Budget: **$15,000**

b) **Educational Video**

Produce a 3-minute video segment on coral reefs to run on hotel in-house television channels. The segments will run on a regular basis and target both Japanese and English speaking visitors. The segments will also be marketed to commercial airlines for use on their in-flight channels. Other languages may be included in the future.

Budget: **$6,000**

c) **Coral Reef Initiative Newsletter**

Write and distribute a quarterly newsletter with current information about Hawaii's coral reef ecosystems and community events including lectures, community meetings, news articles, and scientific studies. Current publications will be used to distribute the information including the University of Hawai'i Sea Grant newsletter *Makai* and the Hawai'i Environmental Educators Association. Articles will also be made available for reprinting in hotel publications and will be accessible on the Hawai'i CRI Network web site.

Budget: **$800/yr.**

d) **Educational Display**

A portable exhibit display will be built for use at special community events, trade shows and festivals to disseminate literature and provide information to the public about Hawai'i's coral reefs. The display will allow consistent and quality educational information to be easily disseminated. The goal of the display is to promote the importance of coral reef ecosystems to the people of Hawai'i for economic, biological, recreational, and cultural reasons. Staffing of the display will be a collaborative effort between volunteers, scientists, and educators.

Budget: **$15,450** for production of the display and printed materials.

2) Monitoring Program

Currently assessment and monitoring of Hawaiian reefs is sporadic and conducted throughout a variety of University of Hawai'i research programs and State and Federal agencies. Establishment of a comprehensive tiered monitoring system that includes the scientific community, resource managers, and volunteers is necessary.

a) **Monitoring Workshop**

Workshop will be held at the University of Hawai'i. The focus of the initial workshop would be three-fold: coordination of the various monitoring efforts; reaching consensus on high priority areas for monitoring; and brainstorming on possible activities for educational and useful volunteer monitoring programs.

Budget: **$15,020.** Includes rental of venue and audio equipment for 3-day workshop, printing of conference materials and final report, meals (breakfast and lunch) for participants, travel and per diem for neighbor island scientists.

b) **Monitoring of Coral Reef Ecosystems**

Development of a coordinated state-wide monitoring program will require cooperation between researchers, resource managers and volunteers. The first phase will include establishment of criteria and consistency in methods and techniques (transect locations and monitoring methods will be described in detail, so that in the future, the work can be duplicated.) Baseline data will be established through the use of permanent transects and remote sensing data as well as historical data where

available. Teams of trained coral reef research professionals (with the assistance of students and volunteers) on each of the islands will coordinate and complete the initial assessment of the reefs and establish quantitative transects. Monitoring will evaluate timing and extent of both natural and anthropogenic impacts on reefs, determine importance of natural variability over different spatial and temporal scales, and document rates of recovery and rates of decline under various environment conditions. All data will be integrated into a GIS and data management system that will be accessible on the Hawai'i CRI Network web site.

Budget: **$700,000** Includes neighbor island calibrations, collaborations, workshops, meetings, publications of results, purchase of digital video system, specialized software, training and hiring of Marine Option Program students, supplies for transecting, hiring of boats for survey staff on Moloka'i and Lāna'i, purchase of satellite and other images, processing of images and training and hiring of students for ground-truthing.

3) Baseline Information and Research

a) Research Projects

The demands of a thriving economy often are in direct conflict with the preservation of healthy coral reef ecosystems. In order to develop a comprehensive management program for coral reef ecosystems, it is paramount that land and water use activities are designed and conducted to minimize adverse impacts on coral reef resources. Research is needed in a variety of areas to determine the potential impact of human activities on natural ecosystems. Research studies that are needed in order to promote effective public and private partnerships in planning and managing our reefs include: the carrying capacities of our coral reef ecosystems; an assessment of the economic value of reefs such as a cost/benefit analysis of maintaining a healthy reef ecosystem; the effects of ocean recreation activities on fish stocks and coral reef ecosystems; and, a study of the impacts of human activities including population growth on coral reef ecosystems.

Budget: **$20,000**/research project.

PUERTO RICO CORAL REEF INITIATIVE PROGRAM

The following projects appear in the order of priority:

1) Baseline Characterization
Develop a baseline characterization of coral reefs in Puerto Rico.

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, variable depths, not recent, incomplete characterizations of sessile-benthos (e.g., no algae, no abiotic), few include fish surveys.
- Most recent quantitative studies (García and Castro, 1995-97) including sessile-benthos and reef fish characterizations are available from highly degraded sites (S.J. Bay, Guayanilla Bay, Mayag. Bay), few characterizations of our "best" coral reefs (La Parguera, Fajardo, Vieques, Culebra, Mona Is.)

Research Needs/Scope

- 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.

Timeframe: 3 years, administered by Department of Marine Sciences, University of Puerto Rico, CRD or private consultant. Data reports delivered to Data Management Center for Reef Studies at JOBANERR.

Cost 3 year study: **$280,000 - $380,000**

Benefits from this study

- Serves as the baseline of 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).

2) Capacitation of Personnel

Technical workshops on coral reef characterization and monitoring.

Information Gaps

- Agencies responsible for protection and management of coral reef resources lack 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.

Research Needs/Scope

- Technical workshop on coral reef characterization and monitoring. Capacitate personnel at JOBANERR, DNR, UPR, Dive Instructors and volunteers.
- Initial effort includes one workshop training for 8 people.
- Expand to summer training course at UPR.

Timeframe: One year

Cost of one Workshop: **$13,000**

3) Coral Reef Monitoring Program

Establish a Coral Reef Monitoring Program at selected reef sites in Puerto Rico

Information Gaps

- CARICOMP only existing, partially implemented, reef monitoring program in Puerto Rico, La Parguera - University of Puerto Rico

Research Needs/Scope

- 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 (Mayaguez Bay, Guayanilla Bay)
  c) low impact sites (Mona Is, Vieques, Culebra)
  d) highly impacted sites (San Juan Bay, Ponce Bay)
  e) sensitive sites to future coastal development (Boqueron, Guánica, Arecibo, Rio Grande, Carolina, Vega Baja).
- Establish a permanent Data Management Center for Coral Reef Studies at JOBANERR that will receive, compile, and make available results from initial reef characterizations and monitoring studies.
- Incorporate geographic (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.
- Use initial reef characterization as the baseline for monitoring program.
- Monitoring of permanent transects at least one time/year at each site.
- Continuous records of temperature and turbidity at eight high priority sites (JOBANERR, La Parguera, Fajardo, Mona Island, Culebra, Mayaguez Bay, Boqueron, Guayanilla)

Timeframe: Long term.

Project Administration: JOBANERR

Costs: Data Management Center, approx. **$50,000**/yr; JOBANERR, approx. **$15,000**/yr/site after initial investment of **$100,000** in acquisition of turbidity meters, multiprobes, data loggers, expendable termistors, calibrated thermometers.

4) Education and Outreach Programs

Information Gaps

- Puerto Rico has some of the best developed coral reefs in the Caribbean, everybody knows that, except us.
- Extremely vague or non-existing information on basic ecological aspects and relevance of coral reef resources for an island like Puerto Rico.
- Lack of education and understanding of the influence of man activities, such as dredging, inland deforestation, domestic sewage effluents, overfishing, anchoring, mangrove clearings, oil spills, thermal effluents and others on the health of coral reefs.
- No awareness by the Puerto Rican public of the recreational value of well managed coral reefs, nor governmental advertising or attention to this effect.
- Very few people recognize the ecotourism potential of coral reefs in Puerto Rico, nor recognize the indirect roles of coral reefs in promoting tourism by their protection of the coastline from erosion - sandy "coralline" beaches.
- Exposure of students to information about coral reefs and particularly coral reefs of Puerto Rico is virtually zero before entering the university.
- Lack of educational background on coral reef systems can be traced back to school teachers themselves.

Research Needs/Scope

- Foster educational programs on coral reefs at elementary, intermediate, and high school levels by preparation of informative videos.
- Use marine reserve facilities to invite school children to attend introductory courses on coral reef ecology.
- Promote the establishment of marine reserves in Puerto Rico with initiatives based at the community level.
- Force governmental agencies to invest federal funds directly into coral reef protection policies, including public awareness and reef monitoring programs.

U.S. VIRGIN ISLANDS
CORAL REEF INITIATIVE PROJECTS AND PROGRAMS

The following projects appear in the order of priority:

1) **Education & Public Awareness**
   1. Provide training for teachers on marine environment. Training will consist of two workshops: 1-St. Croix and 1-St. Thomas. Cost: **$6,000** (Training materials - $1200; Training facility - $4800).
   2. Provide training to the people involved in the visitor industry. This would include tour group operators. One session on St. Croix and one on St. Thomas. Cost: **$6,000** (estimated at $3,000 per session)

2) **Baseline Information and Research**
   1. Digitize all near-shore reefs and overlay adjacent land-based development and include population density. Cost: **$26,000** (Personnel - $20,000; Equipment - $6,000).

3) **Reef Reseeding and Restoration**
   1. Pilot project to replenish areas with coral through reseeding where reefs have been badly degraded. Cost **$35,000-$45,000** (Personnel - $20,000; Other - $15,000-$20,000).

4) **Training and Equipment**
   1. Provide training and equipment for two environmental officers involved in marine law. One for each district. Equipment will include that which is most critical to carry out laws. Cost: **$110,000** (Training 2 Officers - $8,000-$10,000; Purchase 2 outboard motorboats - $50,000ea.).

5) **Monitoring**
   1. Train more staff of agencies and institutions in the methodological and technical approaches to monitor reefs. Cost: **$42,000** (Personnel - 2 scientists x $18,000/3mo.= $36,000; Facilities and Supplies - $6,000).

6) **Reef Reseeding and Restoration**
   1. Conduct a study of ocean recreational activities on declining fish stock. Is there a relationship? Cost: **$96,0000-$106,000** for 2 years (Personnel - $90,000-$100,000; Equipment - $6,000).

STATUS OF THE U.S. ISLANDS CORAL REEF INITIATIVE

STATUS OF THE US ISLANDS CORAL REEF INITIATIVE

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	Marine Patrol, 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	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); HRS 200 restricts boats in certain reef areas; 125 day mooring buoys have been installed; permits required to anchor in MLCDs. CZM: HRS 205A restricts anchoring on coral reefs because of likely adverse environmental and ecological impacts.
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 prohibited in State waters; Clean Water Act, § 404. USCG: Has OPA 90 rules in effect. DPS Marine Patrol and USCG enforce discharge regulations cooperatively.
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 waters of the US and navigable. 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	Hawai'i's Coastal Nonpoint Pollution Control Program has been developed and submitted to the federal government. The plan includes the NPDES permit, county requirements for construction sites, and nonregulatory measures such as siltation basins, grassing, and prohibition of motorized traffic. The CZM program is currently developing the implementation strategy for the plan with assistance from the Department of Health.

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	The plan was completed June 1996.
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	Assessment of Hawai'i's corals has been undertaken by coral reef scientists and volunteers. Scientific input is still needed from the Big Island. Community input is not complete for O'ahu.
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 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	Kāne'ohe 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, Waikīkī Aquarium.
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, Kaua'i. • 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 Waikīkī Aquarium and the Pacific Whale Foundation. • Ho'omalu i Ke Kai celebration, O'ahu. • Sea Search, Exploring Tropical Marine Life, CD-ROM produced by Moanalua Gardens. • School visits, fairs, community events by various non-profit groups including the Waikīkī Aquarium, Sea Life Park, Pacific Whale Foundation, the University of Hawai'i, Hawai'i 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	"Coral and Live Rock Laws of Hawai'i" brochure produced by DLNR. CZM and DLNR staff distributed the brochure at community events throughout the islands.
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 Hawai'i 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 Hawai'i and Dr. James Maragos, East-West Center.
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	Hawai'i 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.

PROJECT REPORTS BY PRINCIPAL INVESTIGATORS

PROJECT REPORTS

BRIEFINGS BY PRINCIPAL INVESTIGATORS

As one of the main purposes of the workshop, the principal investigators of Coral Reef Initiative funded projects from all six jurisdictions presented updates of their projects. Due to considerable time constraints and an ambitious agenda, the reports by the principal investigators were limited to approximately five minutes. However, the presentations enabled project managers and island officials responsible for local coral reef initiatives to increase their awareness of current and ongoing projects on other islands which may be applicable to their needs. Moreover, the projects were discussed during the interactive planning session on the second day of the workshop, when participants had an opportunity to share their knowledge and collaborate on project development.

The following summaries of project reports proceed in the order in which they appeared on the workshop agenda. Some of the principal investigators have been involved in several projects, and have collaborated extensively with other principal investigators. Brief abstracts of the project proposals and the status reports of these projects appear in the categories of monitoring, education and public awareness, reef restoration, and research.

Monitoring

- *Puerto Rico* - **Technical Workshop on Coral Reef Community Characterization and Monitoring** - Dr. Jorge R. García Sais
  The main objective for the technical workshop is the capacitation of students and personnel from governmental agencies in coral reef characterization and monitoring programs. Such expertise is critically lacking in Puerto Rico and is a basic requirement for quantitative assessment of changes in coral reef community structure in relation to both natural and anthropogenic factors. The workshop will include an introduction lecture on coral reef ecology, a description of the characterization and monitoring program design following the CARICOMP protocol, a field work logistics and ocean safety planning exercise, video and live demonstrations of field work procedures including use, calibration and maintenance of multiprobe instruments, performance of the Loya and Porter sessile-benthos transect techniques, phototransects, and belt transects for characterization of motile invertebrates and

fishes. Following the theoretical section is the participant's field performance, discussion of field experiences, data processing and workshop evaluation. Participants include representatives from natural reserves (JOBANERR), governmental agencies (DNR), and universities (U. Humacao, Department of Marine Sciences).

- ***CNMI* - Coral Reef Monitoring Training Project** - Mr. John Furey, Ms. Jessica Tomokane, and Mr. Carlos Ketengenbang
  Several interagency training sessions utilizing underwater photography and videography to demonstrate various techniques for monitoring will be conducted. This project also provides a visual understanding of the existing reef conditions of various areas being monitored in CNMI's coastal waters. The final product is an established monitoring method in which reliable data can be collected and analyzed over a long period of time.

Education and Public Awareness

- ***Hawai'i* - Establishing a Model for Community Involvement in Coral Reef Monitoring for Education and Research** - Mr. Carl Stepath and Mr. Don Heacock. Collaborators: Brian Tissot, James Maragos, Pollette Philips, and Steve Solrysik.
  Carl Stepath described the ten week CRI monitoring workshop for eighth grade students which will be conducted on Kaua'i to form a model useful for community involvement. The students learn what corals are and how corals are formed. They study coral reef ecology and tides, make viewboxes, learn how to lay a transect line, and collect data. They hope to present the workshop information on a web site. Even though the project involves training for monitoring, it should be categorized as an education project because the main intent is to train and educate community participants to provide useful information about their coral reefs. This ten week class provides a mechanism for interaction between the scientific and local communities.

- ***CNMI* - Textbook/Pamphlets Project** - Mr. John Furey, Ms. Jessica Tomokane, and Mr. Carlos Ketengenbang
  CNMI currently lacks educational materials on coral reef ecology. The Coastal Resources Management Program leads an inter-agency project to develop a printable proof of a high school and college textbook which includes several chapters concerning coral reef habitats and their associated life forms. Funding will support the printing costs of the textbook which can be used for promoting the study of coral reef ecosystems in school curriculum.

- ***Hawai'i* - Public Education: Understanding Maui's Coral Reef Ecosystems** - Mr. Eric Brown, Ms. Megan Jones, Ms. Robin Newbold. Collaborators: Maui Activity Owner's Association.
  The six week course was designed to contribute to the visitor industry employee's knowledge about Maui's unique coral reef ecosystems. The course emphasizes an awareness of, and personal responsibility for, the marine environment in which they

work and play. The six two-hour classes educate people who take others out into the environment and who use the reefs. The project facilitates knowledge transfer from employees to visitors who may also have an impact on the reef systems.

- *Hawai'i* - **Teacher Training in Low-Impact Coastal Field Trips and New Marine Multimedia CD-ROM** - Ms. Maura O'Connor and Dr. Carol Hopper
  The educational workshop targets public and private school teachers. The first part of the workshop is held at the Waikīkī Aquarium where teachers explore the tidepool/reef environment, plan low-impact explorations, study biodiversity and ecology of Hawai'i's coastal zone, and plan classroom activities. The second part of the workshop makes use of the new CD-ROM *Sea Search: Exploring Tropical Marine Life*. Teachers also learn how to create their own multimedia presentations about marine environments.

- *Hawai'i* - **Establishing the Hawaii Coral Reef Network on the Internet: Providing a Forum for Education and Research** - Dr. Brian Tissot and Mr. Eric Brown. Collaborators: Carl Stepath and Dave Raney.
  Brian Tissot described the Internet project which provides a public link of centralized information on coral reef ecosystems in a common format. The site will contain the following: directory of state-wide coral reef groups and their activities; current events related to CRI activities; coral reef forum for comments and observations; education materials; coral reef bibliography of publications; and, a database of coral reef data. There is a potential to link information from the other island jurisdictions into this site to make it more regionally and internationally comprehensive. The web site is located at: www.coralreefs.hawaii.edu.

- *Hawai'i* - **A Guide to Hawai'i's Coral Reefs** - Mr. Eric Brown, Ms. Megan Jones, and Ms. Anne Rillero. Collaborators: Hawaiian Humpback Whale National Marine Sanctuary, Maui Visitors Bureau, Maui Ocean Center, Maui Activity Owner's Association, and the County of Maui.
  An appealing educational brochure, "A Guide to Hawaii's Coral Reefs," will be produced and distributed. The underlying theme of the brochure will be "Hawaii's coral reefs are fascinating and we invite you to enjoy them---and we urge you to help protect these reef ecosystems so that future generations may experience their beauty, too." These will be disseminated to boatowners and the general public.

- *Hawai'i* - **Protect Our Reefs: Poster and Sign Project** - Ms. Sherri Carden.
  Sherri Carden of the West Maui Taxpayers Association explained the reef-keeper poster project which relies on low technology inputs. Attractive, educational posters will be installed at harbors and at popular beach, snorkel, and dive sites on Maui. The poster will disseminate information about: state regulations regarding fishing and the taking of live stony corals; federal law which prohibit the approach of marine mammals; and, the harmful effects of standing/walking on corals, feeding fish, and harassing turtles.

- *American Samoa* - **Video Production for Coral Reef Education on Conserving American Samoa's Coral Reefs** - Mr. Lelei Peau
  Lelei Peau explained that some of the project tasks had been completed, but they could not proceed with video production until they received the award money. The funds will be used for the production of a public awareness and education video on the status of the coral reefs in American Samoa. The video will be done in both Samoan and English. It will highlight the history and status of coral reefs in American Samoa and discuss some of the mitigation measures the core group will undertake to promote healthy coral reefs in the territory. It will complement the non-point source pollution video produced by the American Samoa Environmental Protection Agency. The CRI video will emphasize the connection between people's actions on land and the resultant effects on coral reefs and associated fisheries.

- *U.S. Virgin Islands* - **Coral Reef Educational Video** - Dr. Henry Smith
  The Virgin Islands Coastal Zone Management Program feels that it is extremely important to educate the general public of the importance of coastal resources in the socio-economic stability of the Virgin Islands. The coral reef educational video will target all segments of the population. It will focus on the following activities which impact the shoreline: 1) anchoring technique; 2) erosion control; 3) overfishing; and, 4) marine waste disposal.

- *Hawai'i* - **Coral Reef Awareness Video Project** - Ms. Hannah Bernard and Mr. Carl Berg
  The intent of this project is to produce two video tapes using existing and new Hawaiian reef footage, featuring typical coral assemblages, fish and invertebrates, and protected and endangered species. The first video will be 46 minutes long with the intention of enticing people with the beauty reefs into an awareness of efforts they can contribute to maintain these conditions. The videos will be distributed through inflight programs on the major airlines, museums, aquariums, and visitor channels on local television. An edited version of this film, about 15 minutes long, will be used for airlines.

- *Guam* - **Dubbing and Distribution of Educational Video Entitled: "Coral Reefs: Their Health, Our Wealth."** - Dr. Robert Richmond and Mr. Gerald Davis
  The 24 minute long video was completed and has been so successful that Guam would like to produce 1,000 more copies of videos. The video targets school children and covers a range of topics, from an explanation of what corals are and how they reproduce, to the effects of human activities on reef health and what can be done to protect coral reef resources. Using funds from other sources, including a generous donation from "Kids for Coral," an initial run of 2,600 copies of the video was made. These have been widely distributed through the Pacific Islands, the United States, and Europe. The videos are distributed free of charge. Since Guam has already learned the process from making the video, they would be able to advise others doing similar

projects on methods to avoid mistakes. Guam would be willing to give out the video footage for others who want to create their own island-relevant videos, but need to save some costs in recreating the footage. The script for the video exists on disk, and it is possible to give this to everyone. The language can be translated for local use. This video has been shown in community centers.

Reef Restoration

- *Guam* - **Reef Reseeding and Restoration** - Dr. Robert Richmond and Mr. Gerald Davis
  Techniques for the collection and production of coral planula have been refined, simplified, and allow for mass cultivation. Several trials using coral larvae for reseeding purposes have been performed. The University of Guam Marine Laboratory has over 1,000 young coral started from larvae from the August 1997 coral spawning event. Growth rates and survivorship data are being collected. This project will allow coral spawning and reseeding to increase the growth of coral in areas where corals have previously been damaged and have receded.

Research

- *Guam* - **A Test of Whether or Not Coral Recruitment has Really Diminished on Guam** - Dr. Charles Birkeland and Dr. Gustav Paulay
  The research is currently underway. In this study, the researchers placed 64 plexiglass fouling panels in the field at varying depths and attitudes for 77 days, making this test comparable with other tests conducted in the Pacific and the Caribbean. The superficial examination suggested that fewer coral recruits exist than in 1979, although a closer examination of the plates will reveal details more accurately and the final interpretation must await these analyses.

- *Hawai'i* - **Inventory Catalogue of Hawaii's Coral Reefs** - Mr. Carl Berg and Ms. Hannah Bernard
  A catalogue (annotated bibliography) will be produced consisting of research papers, technical reports supporting environmental assessments, and environmental impact statements done on coral reefs in Hawai'i, starting from those published in the 1970's to the present. The catalogue will be created so that it can be integrated into the web-site that is being developed by Brian Tissot and others.

FEDERAL REPORTS

THE UNITED STATES CORAL REEF INITIATIVE FEDERAL AGENCY REPORTS

OFFICE OF OCEAN AND COASTAL RESOURCES MANAGEMENT (OCRM), NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

This interagency effort focuses on forming partnerships with U.S. state and territorial agencies in the Pacific, Caribbean, and the Gulf of Mexico with authority for the management of coral reefs as part of the U.S. Coral Reef Initiative. The results of meetings, discussions, and workshops will be instrumental to the development of local and regional coral reef management plans, as well as the U.S. National CRI Strategy and Implementation Plan. Specifically, this effort has:

1. Provided the forum for state/territorial/commonwealth managers with responsibilities for coral reef protection to meet, receive and share information, determine pressing coral reef management priorities for the areas within their jurisdiction, and develop a consensus as to what national, regional, and local CRI strategy and implementation plans should encompass;

2. Assisted in reaching a Pacific-Gulf/Caribbean U.S. state/territory/commonwealth consensus on a national CRI Strategy and Implementation Plan for the management of coral reef ecosystems within U.S. jurisdiction (state/territory/commonwealth and federal); and,

3. Supported implementation of the local-level Coral Reef Initiatives (CRIs).

Projects funded under a partnership between American Samoa, Hawaii, Commonwealth of the Northern Mariana Islands, Guam, the NOAA's Office of Ocean and Coastal Resource Management and Coastal Services Center, the National Fish and Wildlife Foundation, and the Department of Interior Office of Insular Affairs focused on the areas of:

- education, outreach, training and strengthening management capabilities in support of local CRI initiatives, and
- assessment of existing and/or implementation of new local management strategies for the long-term conservation and sustainable use of coral reef environments.

Examples of projects include: production and distribution of local-level CRI education/ outreach materials (pamphlets, videos, etc.), local-level CRI forums/ workshops, training of local volunteers for coral reef monitoring and assessments, in-service training for teachers, installation of mooring buoys in critical coral habitats, and other activities.

All of these projects were developed in close consultation/collaboration with the Governors Principal Points of Contact (POCs) for the U.S. CRI and State CZM Program, and, where appropriate, National Estuarine Research Reserve System or National Marine Sanctuary Sites.

IUCN/ World Commission on Protected Areas (WCPA)

[Mr. Benoit is the Chair of the North American Working Group]
IUCN has emphasized the need to support the WCPA Program to implement regional Marine and Coastal Protected Areas activities, including a Pacific Islands demonstration for development of MACPAs (i.e., Western and American Samoa).

We are also exploring how U.S. relevant expertise in the region could contribute to a Western Samoan MACPA project and development of a wider regional network, recognizing the key role of SPREP in this regard. A Pacific Islands MACPA workshop, building on the work already underway could be one means of doing this.

In order to assist in providing adequate tools and methods for selecting and managing MACPAs, OCRM will be producing the *Proceedings of the Second International Symposium and Workshop on Marine and Coastal Protected Areas* that was held in Tampa, FL, USA in 1995 and chaired by Dr. Crosby. This workshop focused on MACPA site selection procedures. The document will also include a number of original manuscripts dealing with various MACPA issues. After extensive external peer review, this Proceedings document will be sent to the printers this month.

U.S. MAB Marine and Coastal Ecosystem Directorate Core Project:

Ecological and Socio-Economic Impacts of Alternative Access Management Strategies in Marine Protected Areas

[Dr. Crosby is Chair of the Directorate and Lead Principal Investigator for the Project]
This Core Project addresses specific and fundamental needs of marine and coastal resource managers in AFPIs by focusing on the ecological and socio-economic impacts of alternative access management strategies in Marine and Coastal Protected Areas (MACPAs). The primary objective of the MACE Core Project is to produce information that will serve to build more cohesive partnerships between Managers, Scientists, Indigenous Peoples, and the Public at large for the development, implementation, and operation of MACPAs. This information will form the basis for the development of a Reference Manual for MACPA Managers tentatively entitled "Resource Directory and Guidelines for Access Management in Marine and Coastal Protected Areas."

NOAA/EPA/DOD - Training for coral reef monitoring in AFPIs

[Dr. Crosby is Lead Principal Investigator for this training project]
The collaborative interplay between EPA, DOD, and NOAA scientists, UH coral reef scientists, as well as Hawaiian and CNMI Coastal Zone and Natural Resource agencies has produced "low-technology," low cost, easily transferable techniques for detecting sub-lethal change in coral reef habitats. We are also seeking to develop a) management measure for various types and causes of environmental stress to coral reef systems, and b) identification of reference conditions, indicator communities and survey techniques for bio-criteria development. This information is vital to the future planning and management of sensitive marine habitats and supports the empowerment of local populations in the ability to better assess and manage their coral reef ecosystems. The project specifically focuses on facilitating transfer of developed techniques and information to local indigenous peoples in the AFPI and other sites around the world that critically need assistance in determining the level and degree of environmental perturbations to coral and hard bottom marine habitats. Several training sessions have been held in Hawai'i and Saipan with more planned over the next year in American Samoa and other Pacific Islands.

NODC Coastal Ocean Data and Information Products Working Group

This is one of three working groups that the National Oceanographic Data Center has created to increase their relevancy to NOAA's Coastal Programs and priorities:

- NODC Working Group on Coastal Ocean Data Quality Assurance;
- NODC Working Group on Coastal Ocean Data Acquisition; and
- NODC Working Group on Coastal Ocean Data and Information Products.

Dr. Crosby serves as the Chair of the NODC Working Group on Coastal Ocean Data and Information Products. Island representatives on this working group include - Evangeline Lujan, Geographic Information Systems Manager, Bureau of Planning, Guam and Ed Towle, Island Resources Foundation, St. Thomas, U.S. Virgin Islands. The first meeting will take place in October 1997. This group will have as its "terms of reference" to:

- Evaluate all existing NODC products related to the coastal ocean;
- Recommend modifications or elimination of existing NODC products;
- Recommend new NODC data and information products;
- Set criteria for data browsing, sub-setting, graphics, visualization, on-line/off-line access;
- Consider training and technology transfer requirements;
- Recommend modified or new procedures or terms of reference for the Working Group's activities; and
- Other related activities mutually agreed upon by NODC and the working group.

OFFICE OF INSULAR AFFAIRS (OIA), U.S. DEPARTMENT OF THE INTERIOR (DOI)

The Office of Insular Affairs (OIA) worked in partnership with the insular areas on an administration initiative to sustainably manage coral reefs and related ecosystems. This initiative was announced at the UN Small Islands Developing States conference in May 1994 in response to Agenda 21 of the Earth Summit. OIA provided funding for and participated in workshops in the Pacific and Caribbean for the purpose of identifying the major problems affecting coral reef ecosystems in the islands and developing plans of action to address those concerns. OIA also funded Guam's participation as a member of the U.S. Delegation to the International Coral Reef Initiative Workshop held in the Philippines in May-June 1995, and helped fund a videotape on the status of coral reefs worldwide called "The Fragile Ring of Life," which featured the Republic of Palau, among other countries.

Numerous regional workshops have been held since the International Conference to develop regional plans to implement the "Call to Action" and "Framework for Action" adopted at the Philippines workshop. The American Flag Pacific Island Initiative and the was developed in 1995 through these workshops.

The Department of Interior's newspaper, *People, Land, and Water*, featured an article on the Department of Interior's activities with respect to the Coral Reef Initiative. It also summarized the coral reef activities in some of the insular areas.

Through the partnership among NOAA, National Fish and Wildlife Foundation, and the Office of Insular Affairs, we jointly funded local education and outreach projects in the islands.

With respect to the Fiscal Year 1999 budget, the Secretary of the Interior has asked key bureaus in the Department, namely, the Fish and Wildlife Service, the National Park Service, the U.S. Geological Survey, and the Office of Insular Affairs, to place more emphasis on meeting the objectives of the Coral Reef Initiative within existing budget targets.

The Office of Insular Affairs, is committed to spending approximately $200,000 in Fiscal Year 1998, which begins October 1, 1997, to implement projects identified in the Coral Reef Initiative plans of action being developed through this workshop.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA has been a supporting member of the International Coral Reef Initiative. ICRI is composed of several federal resource management agencies with overall guidance provided by the Department of State. There is also a US Coral Reef Initiative (CRI) to address domestic concerns.

The objectives of both programs should be viewed in the global context. Objectives are broad and are intended to:

1. Expand the implementation of programs for conservation, restoration and management of sustainable coral reefs and their associated communities among governments and international organizations.
2. Incorporate management provisions into existing local, regional, and national development plans that provide for protection, restoration, and sustainable use of corals and their associated communities.
3. Strengthen the capacity for development and implementation of management policies and research, and monitoring of coral ecosystems.
4. Establish and maintain coordination of international regional and national research and monitoring programs to ensure efficient use of resources and information flow.

EPA has been involved in domestic and international projects directed to coral conservation. The U.S. has numerous responsibilities to island territories in the Caribbean and Pacific. Office of Water, Oceans, and Wetlands (OWOW) in EPA has been working on training in the area of coral reef management.

The 45 minute video, "The Fragile Ring of Life," was developed, produced, and is distributed by the U.S. Information Agency (USIA), with funding from EPA and other government agencies. The video highlights the worldwide destruction of coral reef and efforts being made in seven countries to save the remaining living reefs. This film has been the recipient of several awards which include the National Geographic Societies Earthwatch Film Award and an international Bronze World medal at the New York Film Festival. It has been awarded the CINE Golden Eagle to represent the United States at international festivals.

The Environmental Protection Agency (EPA) has a history working with coral reefs in cooperation with the National Oceanic and Atmospheric Administration (NOAA). The EPA frequently works with counterparts. EPA has worked with NOAA on butterfly fish training for monitoring coral reef health.

Federal money which becomes available for islands from the EPA can be spent on a variety of projects. The island governments prioritize these projects and determine how to spend the funding. The primary use of funding for coral reef management has been in regulatory activities.

NATIONAL MARINE FISHERIES SERVICE (NMFS), NOAA

Recent Coral Reef Associated Projects

The following list of projects, submitted as a follow-up to the Coral Reef Initiative Meeting held on Maui, September 25-26, 1997, have been completed, or are presently underway, by the Pacific Area Office, National Marine Fisheries Service (NMFS). The NMFS point of contact for this work is John Naughton, NMFS, Pacific Islands Environmental Coordinator.

Hawaiian Islands:

1. Barber's Point Deep Draft Harbor entrance channel modification project. Survey of coral reef habitat and associated marine resources.
2. Kawaihae coral transplant project. Transplant 15 tons of coral as mitigation for completion of the Kawaihae Small Boat Harbor, Island of Hawai'i.
3. Kaneohe Bay coral transplant project. Transplant coral as mitigation for maintenance dredging of Kāne'ohe Yacht Club, Kāne'ohe, O'ahu.
4. Assessment of shorelines and shallow reef areas for oil spill planning in the Hawaiian Islands. O'ahu and Maui completed. Kaho'olawe recently surveyed.
5. Membership on the Kaho'olawe Ocean Management Plan, Technical Review Committee.
6. Pearl Harbor Chevron pipeline oil spill. Presently conducting Natural Resources Damage Assessment under OPA90.

U.S. Pacific Flag Islands:

1. Palau Compact Road Project. Construct a 53-mile road around the Island of Babeldoab, Republic of Palau (ROP). Team member to conduct surveys and develop Federal EIS for the project.
2. Palau Coral Reef Research Center. Member of the U.S. State Department Team to negotiate with the ROP and Government of Japan (GOJ) to construct and operate the Research Center in Palau. The GOJ has committed to construct the Center under their foreign aid program.
3. U.S. Army Kwajalein Atoll (USAKA) missile range surveys. Conduct coral reef habitat and species inventories of waters surrounding the 10 leased islands at USAKA, Republic of the Marshall Islands.
4. Farallon de Mendinilla (FDM) target island surveys. Conduct habitat and species inventories of nearshore waters surrounding FDM target island, Commonwealth of the Northern Mariana Islands (CNMI).
5. Survey of proposed salvage and artifact recovery from the Spanish Galleon Santa Margarita, sunk in 1601 off the north coast of Rota, CNMI.
6. Survey and designation of U.S. Navy SEAL explosives training areas in coastal waters of Guam.

7. Assessment of potential marine protected areas at seven islands and atolls in the northern Marshall Islands, Republic of the Marshall Islands.
8. Assessment of potential marine protected areas at Oroluk Atoll and Minto Reef, Federated States of Micronesia.

U.S. FISH AND WILDLIFE SERVICE

The following projects are a list of the most recent project in which the U.S. Fish and Wildlife Service, in Honolulu, Hawai'i has been engaged:

Hawai'i

1. **Barbers Point Deep-Draft Harbor Modification.** Conducted Fish and Wildlife Coordination Act (FWCA) surveys of marine species and habitats adjacent to the harbor entrance channel for project impact evaluation and mitigation recommendations.

2. **Wailupe Flood Control Project.** Conducted FWCA surveys of marine species and habitats fronting Wailupe Stream for project impact evaluation and mitigation recommendations.

3. **Kawaihae Light-Draft Harbor Project.** Conducted FWCA surveys of marine species and habitats fronting the harbor for project impact evaluation and mitigation recommendations and managed mitigation projects involving coral transplantation (approx. 15 tons) and nearshore reef habitat restoration (Pelekane Bay).

4. **Kāne'ohe Bay Yacht Club Maintenance Dredging.** Provided technical assistance regarding the selection, movement, and relocation of corals prior to maintenance dredging within boat slip areas.

5. **Hawksbill Sea Turtle Monitoring.** Funded the monitoring of nesting activities and tagging of hatchlings at sites in the main Hawaiian Islands.

6. **Green Sea Turtle Fibropapiloma Research.** Funded fibropapiloma virus isolation research green sea turtles, including immunological, hematological, and vaccination response aspects.

7. **Hawaiian Islands National Wildlife Refuge (NWR) Reef Investigation.** Participated in a reconnaissance survey of marine resources within the refuge, including French Frigate Shoals and Laysan Island.

8. **State of Hawai'i Day-use Boat Moorings.** Provided technical assistance regarding the siting of and installation protocols for a state-wide system of small boat mooring buoys in the main Hawaiian Islands.

9. **Pearl Harbor Oil Spill Assessment.** Participated in a spill response effort and subsequent natural resource damage assessment related to an oil spill in Pearl Harbor by the Chevron Oil Co.

Commonwealth of the Northern Mariana Islands

1. **Kagman Watershed Project.** Conducted FWCA surveys of marine species and habitats fronting Unai Laolao Kattan (Tank Beach) for project impact evaluation and mitigation recommendations.

2. **Talakaya Reef Survey.** Conducted a survey of marine species and habitats on the fringing reef fronting the Talakaya Watershed on the island of Rota.

3. **Coral Gardens Reef Survey.** Conducted a survey of marine species and habitats on the fringing reef fronting the Sasanhaya Bay Fish Reserve on the island of Rota.

4. **Unai Chulu Coral Survey.** Participated in a survey of corals on the fringing reef flat fronting Unai Chulu on the island of Tinian.

5. **FDM Reef Survey.** Participated in a survey of the nearshore fringing reef surrounding the island of Farallon de Medinilla.

6. **Sea Turtle Nesting Survey.** Conducted monitoring of sea turtle nesting activities on the island of Tinian, including the training of local Conservation Officers in the monitoring techniques used.

7. **Spanish Galleon Salvage.** Surveyed the condition of coral-reef habitat at the salvage site of the *Santa Margarita* and provided project-related, reef-protection recommendations.

Guam

1. **Hurricane Storm Damage Reduction.** Conducted FWCA surveys of marine species and habitats fronting Commercial Port Road on Cabras Island for project impact evaluation and mitigation recommendations.

2. **Marine Preserve Establishment.** Participated in the development and establishment of a marine preserve adjacent to Anderson Air Force Base.

3. **Guam National Wildlife Refuge.** Funded reconnaissance surveys of marine resources within the refuge boundaries.

4. **Military Training in the Mariana Islands.** Participated in a reconnaissance survey marine species and habitats at a proposed U.S. Navy SEAL explosives training area fronting Dadi Beach.

American Samoa

1. **Rose Atoll NWR Reef Monitoring.** Conducted multiyear monitoring of changes to the reef ecosystem resulting from the physical and chemical impacts associated with the grounding of a commercial, tuna longline fishing vessel.

2. **Rose Atoll NWR Public Outreach.** Funded the fabrication of a photo exhibit on the resources of Rose Atoll NWR for display at the Visitors Center of the National Park of American Samoa.

3. **Pago Pago Harbor Grounded Vessel Removal.** Provided technical assistance on marine resources in Pago Pago Harbor in relation to the potential removal of several grounded longliners.

4. **Fagatele Bay National Marine Sanctuary.** Participated in the establishment of the sanctuary on the island of Tutuila.

U.S.-Affiliated Pacific Islands

1. **Midway Atoll NWR Reef Investigation.** Conducted reconnaissance survey of marine resources within the refuge boundaries.

2. **Midway Atoll NWR Alien Marine Species Inventory.** Funded field survey and report on the identification and distribution of alien marine organisms in Midway Lagoon.

3. **Palau Compact Road Project.** Participating in the development of a project to construct a major road system on the island of Babeldaob, Republic of Palau.

4. **Palau Rapid Ecological Assessment-Southwest Islands.** Participated in a survey of the marine and other coastal resources of the southwest islands of Palau

5. **USAKA Environmental Standards.** Participated in the development and ongoing implementation of standards to protect marine and other natural resources at the U.S. Army Kwajalein Atoll (USAKA), Republic of the Marshall Islands.

6. **USAKA Species Inventory.** Participated in an inventory of marine and other "species of concern" at USAKA.

7. **Chuuk Lagoon Coastal Resource Inventory.** Participated in an inventory of marine and other coastal resources within Chuuk Lagoon, Federated States of Micronesia.

8. **Johnston Atoll NWR Construction Impact Evaluation.** Conducted analyses of impacts resulting from military construction at Johnston Atoll.

Over and above these projects, the USFWS Ecological Services Division has the responsibility for review and assessment of development projects throughout the U.S. Flag Pacific Islands that require federal permits or licenses or that receive federal funding. Cumulatively, this is a substantial effort that involves numerous projects on an annual basis.

WESTERN PACIFIC REGIONAL FISHERIES MANAGEMENT COUNCIL

(The following description of WPRPMC's participation in coral reef management is excerpted from the Executive Summary of the final report, "An Assessment of the Status of Coral Reef Resources, and their Patterns of Use in the U.S. Pacific Islands," prepared by Alison Green in October 1997 for the Western Pacific Regional Fisheries Management Council funded under Award No. NA67AC0940 by the National Oceanic and Atmospheric Administration.)

The Western Pacific Regional Fisheries Management Council (WPRFMC) is the policy-making organization for the management of fisheries in the federal waters (generally the EEZ, 3-200 nm from shore) in the Western Pacific Region. This includes the waters surrounding the U.S. Pacific Islands: State of Hawaii, Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands, and the unincorporated other U.S. Pacific Islands. WPRFMC currently has Fisheries Management Plans (FMPs) in place for fisheries of four species groups: crustaceans, precious corals, bottomfish and seamount groundfish, and pelagics.

To determine if there are any current management needs for coral reef resources in federal waters, the Council sponsored a report to summarize available information from the region on the status of coral reef resources, their patterns of use and existing management regimes. The scope of the report includes a synthesis of information contained in scientific papers and unpublished reports, as well as comments from representatives of local government agencies and knowledgeable individuals (scientists, fishermen, and dive operators).

Through two stages of this project, a preliminary assessment and a detailed assessment, WPRFMC investigated the extent and condition of the coral reef resources, their pattern of use, and the existing management regimes. They also considered the status of special management issues, which may be affecting coral reefs. This includes the presence of specialized coral reef fisheries (the live reef fish and aquarium fish trades) and the extent of habitat degradation caused by human impacts (including overfishing, sedimentation,

nutrient loading, coastal construction, pollution and contamination, destructive fishing practices, tourism, recreation and military activities).

Management Needs

WPRFMC found that the assessment did not reveal any major management needs for the coral reef resources in the EEZ of the Western Pacific Region at the present, since most of the reefs are in good condition and only lightly used, if at all. The use of the island of Farallon de Mendinilla (FDM), the largest area of coral reef in the EEZ outside the State of Hawaii, as a military bombing target in CNMI may warrant Council consideration, such as a comprehensive assessment of the fisheries resources at FDM and the possible effects of the bombing on these resources. Local fishermen harvesting shallow-water bottomfish at FDM believe that the bombing is impacting the fisheries resources in the area. The ongoing use of the island as a target is now being reassessed, with the intent of continuing or expanding training operations.

Another situation which may require attention is the status of the coral reefs and their associated fisheries on the few offshore banks and shoals that are being heavily fished in the EEZ at present. This would include Penguin Bank in Hawaii, Galvez Bank on Guam, and Esmeralda Bank and the banks surrounding Farallon de Mendinilla in CNMI. A more thorough assessment of the condition of these reefs, and their patterns of use, is required before management recommendations can be made for these areas.

A more critical issue is the mounting body of evidence that the coral reef resources in state and territorial waters in the region are being degraded and over-exploited. Local government agencies, which area responsible for managing these resources, may need to increase the priority of allocating funds to protect these resources. Another option may be for the Council to consider establishing reefs in remote federal waters as fishing reserves, which may act as sources of larvae for the replenishment of some of the species that are heavily exploited on nearshore reefs.

It is also recommended that the need for management of coral reef resources in the EEZ be reassessed at regular intervals in the future, in case the situation changes. Management needs should also be reconsidered at an earlier date if there is any evidence to suggest that substantial changes have occurred. Such changes may include increased threats to coral reef health, or an increase in fishing pressure by either local or foreign fishing vessels. The situation should also be reassessed if specialized fisheries become established in the area. For example, if the live reef fish trade becomes established, since this trade has become a major fisheries management issue elsewhere in the Asia-Pacific Region.

Other aspects for further consideration include:

1. Information Needs

   This assessment was constrained by the general absence of good quality information on the condition of the reefs in the EEZ, and the total landings of coral

reef resources in each state and territory. Options to fill these important gaps in our knowledge should be considered, including identifying support for detailed resource assessments and the collection and analysis of improved fisheries statistics by local government agencies.

2. Overlap with existing FMPs

Three of the Council's FMPs have the potential for considerable overlap with management of coral reef resources in the EEZ, possibly through a new FMP: the Bottomfish and Seamount Groundfish FMP, the Crustacean FMP and the Precious Corals FMP. To clarify this issue, it would be important to identify which species, depths and gear types are covered by each plan. Alternatively, an ecosystem-based FMP encompassing all of these fisheries may be a better management approach because the complexity of interactions among reef-associated species and shared habitat may make it difficult to manage these fisheries independently.

3. Jurisdiction

The issue of jurisdiction over coral reef resources is complicated and unresolved in many areas in the Western Pacific Region, especially in CNMI. It is recommended that his issue be addressed before proceeding with a management plan for the coral reef fisheries in the region.

U.S. ISLANDS
CORAL REEF INITIATIVE
GUIDELINES

U.S. ISLANDS CORAL REEF INITIATIVE GUIDELINES

MISSION STATEMENT

The U.S. Islands Coral Reef Initiative fosters innovative cross-disciplinary approaches to sustainable management and conservation of coral reef biodiversity and ecosystems through the development of cooperative relationships among the various stakeholders as an effort to conserve and restore coral reef ecosystems at local levels for the use and enjoyment of future generations.

VISION STATEMENT

Coral reef ecosystems are vital natural resources in the American Flag Pacific Islands, the Commonwealth of Puerto Rico and the U.S. Virgin Islands. These beautiful and diverse systems are essential to residents as sources of food and enhancement for social and cultural activities important to our heritage and tourism, the largest industry in these islands. Moreover, coral reefs protect nearshore areas from storm waves, build new land masses, and are a source of natural products for the food and pharmaceutical industries. The sustainable use of coral reef ecosystems and the perpetuation of their economic, cultural, and environmental functions should be the guiding principles in planning and managing growth in the American Flag Pacific Islands, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

GOALS

To maintain the high biodiversity, health, and beauty of coral reef ecosystems, the Coral Reef Initiative Management Program in the American Flag Pacific Islands, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands will:

- Increase public education and support for the perpetuation of coral reef ecosystems and for instilling stewardship for future generations.
- 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.
- Promote sound reef preservation projects.
- Develop comparable baseline data on reef status for all islands.
- Document the effects of land-based pollution sources and cumulative and secondary processes affecting coral reef systems.
- Secure adequate financial resources and increase the technical capacity of island governments to manage coral reef ecosystems for sustainable resource use.

CORAL REEF INITIATIVE VISION

This visioning exercise provided the opening to the workshop. Participants answered the following open-ended statement, and came up with statements which fell into the categories of coral reef management, funding strategies, education, public awareness, and lobbying, participation and communication, legislation, and technical support, research and monitoring.

In five years, this is where we would like to see the Coral Reef Initiative in the U.S. Islands:

Coral Reef Management

- Coral reef ecosystems are effectively monitored and managed on an effective and continuous basis with sustained funding and involvement of local communities, government agencies, scientists, and other concerned citizens.
- Improve ability to mitigate damage of development.
- Accountability of private sector or developers for their impact on coral reefs.
- Defined agency responsibility. Shared information and technical assistance.
- Flexibility in understanding that resource management extends beyond political boundaries, and there is a great need among the islands to pool their resources and network internationally.
- Demonstration project started and ongoing in each American Flag Island at sites identified by the local governments, which taps local resource knowledge, based on principles defined here.
- Vertical integration. Integrated land and marine management. Sustainable resource utilization. Community Ownership of reefs.
- Holistic approach to ocean management.
- Comprehensive system of protected areas. Recognize the importance of three separate and important coastal ecosystems: corals, mangroves, and seagrasses.
- Overall management scheme for cumulative management of all stressors.
- Mechanism for closures, recovery, and restoration. Specific actions that lead to these.
- In five years, be able to determine appropriate uses of coral reef areas based on carrying capacities. Recognize competing uses. Identify protected areas; various designations for multiple uses.
- Develop compatible monitoring protocols.

Funding Strategies

- Steady funding stream.
- User fees.
- Funding equity. Clarify specific needs--- especially $, for the islands. The funding, partnerships, and networks need to take into account the resources available in a particular jurisdiction.
- NOAA maintains a budget for domestic CRI. Need funded CRI Coordinator.

Education, Public Awareness, and Lobbying

- Common understanding of the value of coral reefs. Value intrinsic Quality of Coral Reefs.
- Stewardship Ethic among users and managers.
- Coral reef curriculum.
- Education and care of reefs in school curriculums. Develop aggressive education programs for users. Develop community education programs. Build constituency through community education. Involve airlines in tourist education.
- Develop a better understanding of CRI in Washington D.C. among legislators and agencies.
- USACOE - Have the Army Corps develop a coral reef curriculum and understand the importance of the Coral Reef Initiative. OR no longer have the permit authority for shoreline hardening.

Participation and Communication

- Collaboration and Networking. Effective communication among scientists, communities, and policy makers.
- Local community participation in management, mitigation, and enforcement.
- Identify parameters for gathering baseline information and communicate these parameters, through such means as the Internet.
- Identify one place to store, process, and disseminate information.

Legislation

- Legislation- coherent, providers management tools for effective enforcement.
- Goal: No net loss of resources defined in legislation. Need a better legal framework and legislation to deal with issues, such as alien species introduction.

Technical Support, Research, and Monitoring

- Support and Expertise identified: defined goals in coral reef work.
- Recognize the importance of fishery resources. Return of the goatfish (an indicator species of good coral health).
- Develop CRI-specific protocols for environmental assessments.

U.S. ISLANDS
CORAL REEF INITIATIVE
WORKSHOP PARTICIPANTS

U.S. Islands Coral Reef Initiative Workshop
Participants List

American Samoa

Lelei Peau
Manager, American Samoa Coastal Management Program
American Samoa
(684) 633-5155
lpeau@ocean.nos.noaa.gov

Commonwealth of the Northern Mariana Islands

Eric Gilman
Special Assistant for Environment
CNMI Governor's Office
Saipan, MP
(670) 664-2238
eric.gilman@saipan.com

Manuel Sablan
Director
Coastal Resource Management Program
Saipan, MP
(670) 234-6623, 234-7320

Guam

Michael L. Ham
Administrator, Bureau of Planning
Guam Coastal Management Program
P.O. Box 2950
Agana, GU 96932
(671) 475-9672
mham@kuentos.guam.net

Robert Richmond
Professor of Marine Biology
University of Guam Marine Lab
UOG Station
Mangilao, GU 96923
(671) 735-2188
richmond@uog9.uog.edu

Hawai'i

Doug Tom
Planning Program Manager
Hawaii Coastal Zone Management Program
P.O. Box 2359
Honolulu, HI 96804
(808) 587-2883
(808) 587-2899 fax
dtom@dbedt.hawaii.gov

William S. Devick
Acting Administrator
Division of Aquatic Resources
Department of Land and Natural Resources
1151 Punchbowl Street, Room 330
Honolulu, HI 96813
(808) 887-0100
(808) 587-0015

Claire Cappelle
Planning and Policy Analyst
Hawai'i Coastal Zone Management Program
P.O. Box 2359
Honolulu, HI 96804
(808) 587-2880
(808) 587-2899 fax
jccappele@dbedt.hawaii.gov

Skippy Hau
Aquatic Biologist
Department of Land and Natural Resources,
Division of Aquatic Resources
130 Mahalani Street
Wailuku, HI 96793
(808) 243-5327
(808) 243-5326 fax
skippy@dar.ccmail.compuserve.com

Hannah Bernard
Director of Education
Hawai'i Wildlife Fund
P.O. Box 5361
Lahaina, HI 96761
(808) 667-0437
(808) 661-9126 fax

Eric Brown
Research Associate
Pacific Whale Foundation
101 N. Kihei Rd., #21
Kihei, HI 96753

Sherri Carden
West Maui Taxpayers Association
P.O. Box 102
Lahaina, HI 96767
(808) 669-4743
gene@mauinet.com

Rose Pfund
UH Sea Grant
1000 Pope Road, MSB 220
Honolulu, HI 96522
(808) 956-7031
pfund@hawaii.edu

Dave Raney
Sierra Club, Hawai'i Chapter
1621 Mikahala Way
Honolulu, HI 96816
(808) 734-4986
d_raney@aloha.net

Carl Stepath
Executive Director
Save Our Seas
P.O. Box 1437
Paia, HI 96779
(808) 579-6282
sos@aloha.net

Brian Tissot
Associate Professor
University of Hawai'i
200 W. Kawili St.
Hilo, HI 96720
(808) 974-7383
tissot@hawaii.edu

Jeffrey Walters
Hawaii Coastal Zone Management Program
P.O. Box 2359
Honolulu, HI 96804
(808) 587-2883
jwalters@dbedt.hawaii.gov

PUERTO RICO

Jorge Reni García
Research Associate
Department of Marine Sciences
University of Puerto Rico - Mayagnez
P.O. Box 908
Lajas, PR 00667
(787) 899-2048 x247
renigar@caribe.net

U.S. VIRGIN ISLANDS

Paul Thomas
Department of Planning and Natural Resources
396-1 Annas Retreat
St. Thomas, US Virgin Islands 00802
(809) 774-3320
(809) 775-5706 fax
pthomas@surf.nos.noaa.gov

Henry Smith
Director
Eastern Caribbean Center
University of the Virgin Islands
St. Thomas, USVI 00802
(809) 693-1020
(809) 693-1025 fax
hsmith@uvi.edu

FEDERAL AGENCIES

Michael Crosby
National Research Coordinator
OCRM/NOAA
Co-Chair, US Coral Reef Initiative
(301) 713-3155 x114
michael.crosby@noaa.gov

Nancy L. B. Fanning
Department of Interior
Office of Insular Affairs
1849 C Street NW
Washington, DC 20240
(202) 208-6816
Nancy_Fanning@IOS.DOI.GOV

Norman Lovelace
US EPA Region IX
San Francisco, CA
(415) 744-1599
lovelace.norm@epamail.epa.gov

Michael Molina
Marine Biologist
US Fish and Wildlife Service
300 Ala Moana Blvd., Room 3108
Honolulu, HI 96850
(808) 541-3441
michael_molina@mail.fws.gov

John Naughton
Pacific Island Environmental Coordinator
US National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822
(808) 973-2940
(808) 973-2941 fax
John.Naughton@noaa.gov

Kitty Simonds
Western Pacific Regional Fishery Management Council
Honolulu, HI
(808) 522-8220
Kitty.Simonds@noaa.gov

Robert Schroeder
Western Pacific Regional Fishery Management Council
1164 Bishop Street, Suite 1400
Honolulu, HI 96813
(808)522-8220
Robert.Schroeder@noaa.gov

OTHERS

Jerry B. Norris
Executive Director
Pacific Basin Development Council
711 Kapi'olani Blvd.
Honolulu, HI 96813
(808) 596-7229
(808) 596-7249 fax
jnorris@elele.peacesat.hawaii.edu

Michael P. Hamnett
Senior Policy Analyst
Pacific Basin Development Council
Director, UH Social Science Research Institute
2424 Maile Way, Porteus 704
Honolulu, HI 96822
(808) 956-7469
(808) 956-2884 fax
hamnett@hawaii.edu

Cheryl L. Anderson
Planner/Research Associate
UH Social Science Research Institute, Center for Development Studies
2424 Maile Way, SSRI 719
Honolulu, HI 96822
(808) 956-3908
(808) 956-2889 fax